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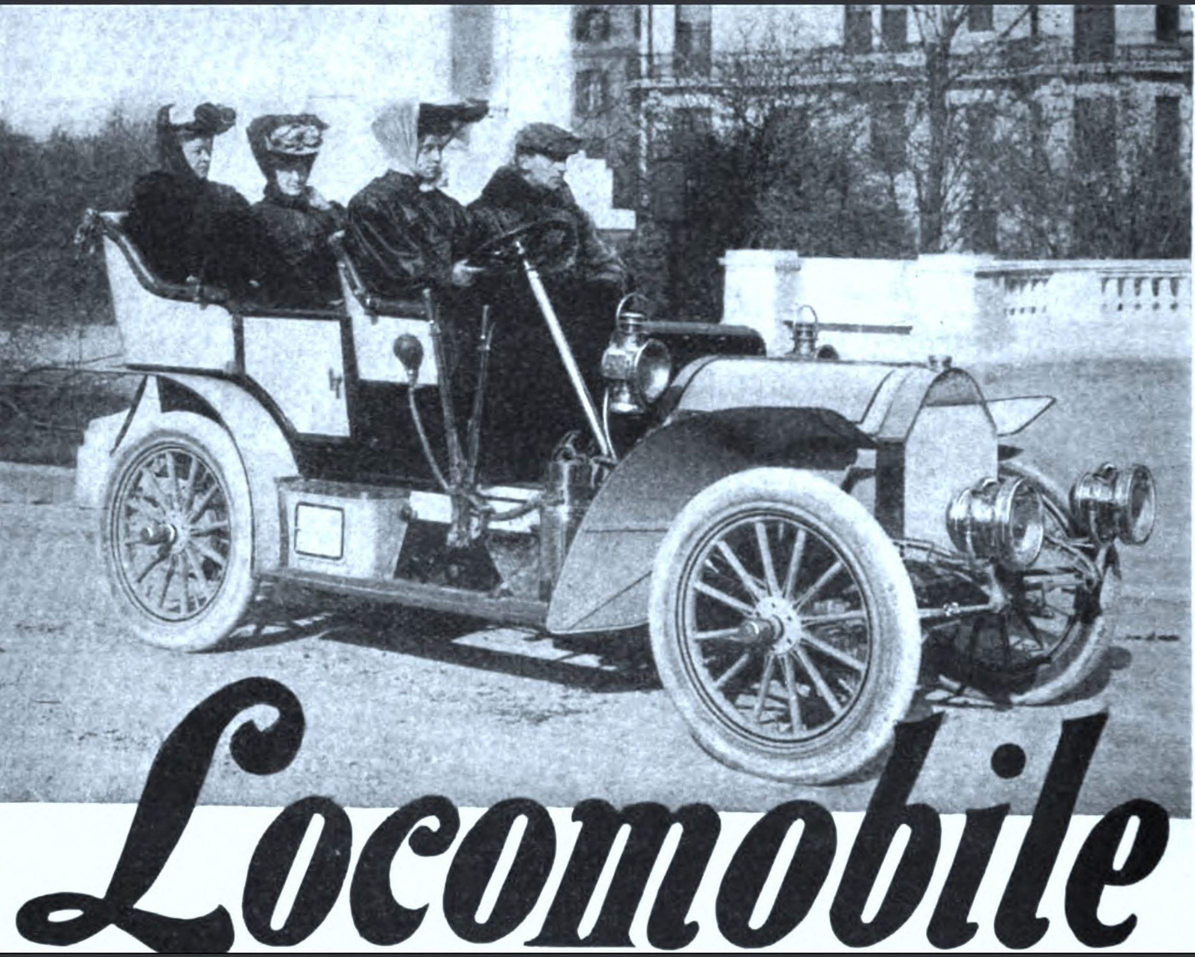
Locomobile

Automobile trade journal

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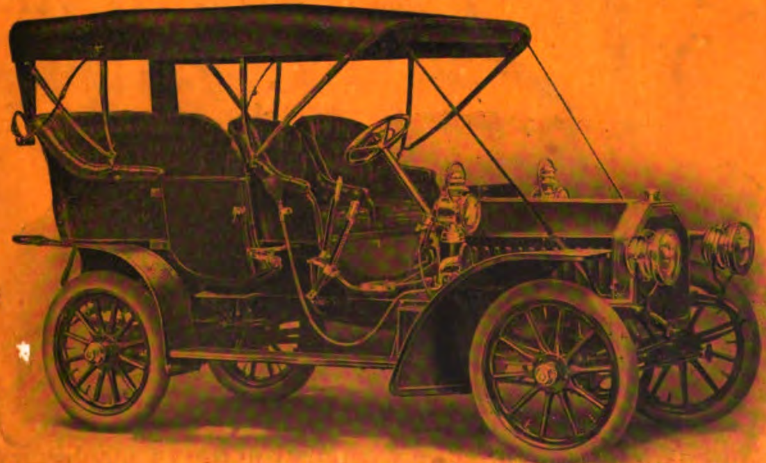
X, No. 10 PHILADELPHIA AND NEW YORK APRIL 1, 1906

CYCLE AND AUTOMOBILE TRADE JOURNAL

Peerless



It is what one does, not what one claims, that makes a reputation. The Peerless has the reputation for always making good.

THE PEERLESS MOTOR CAR CO.

806 QUINCY ST., CLEVELAND, OHIO

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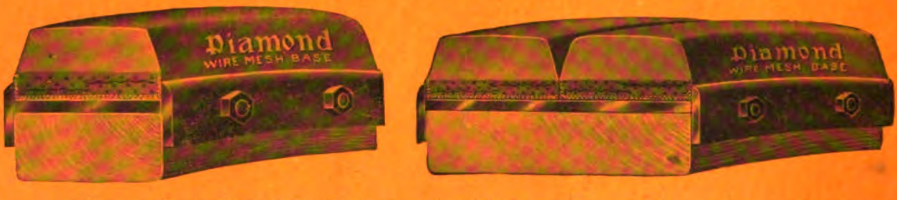
Not Merely a Large Buggy Tire

Diamond

Wire Mesh Base Construction

For Motor Trucks and Commercial Cars



The only scientifically correct tire offered for the purposes named.

It is not in the experimental stage. It has proved itself a world beater.

Made in single and above 5 inch in twin types.

Can be applied by anyone without the use of machinery.

Special catalogue on request.

The Diamond Rubber Co.

AKRON, OHIO.

...LARGEST...

AUTOMOBILE SUPPLY HOUSE

IN AMERICA

3 New Stores Opened for Business

924 Eighth Avenue, New York

Within 200 Feet of The New Club House

OF THE

Automobile Club of America

Detroit Branch: 227½-229 Jefferson Ave.
Buffalo Branch: 824 Main Street.

Buy from the Nearest Branch and Save Time and Transportation Charges.

Our 1906 catalog is the most comprehensive of its kind ever gotten up, now on the press and will be mailed upon request.

CHAS. E. MILLER

Manufacturer, Jobber, Exporter and Importer

HOME OFFICE:

97-101 Reade St., New York

Branches: 924 Eighth Ave., New York; 318-320 N. Broad St., Philadelphia, Pa.; 202-204 Columbus Ave., Boston, Mass.; 406 Erie St., Cleveland, O.; 227½-229 Jefferson Ave., Detroit, Mich., and 824 Main St., Buffalo, New York.

The Largest Automobile Supply House in America

8,000 MILES

Perfect Satisfaction. Never Breaking

HOTEL TOURAINE
BOSTON

July 3d, 1905.

BRAMPTON, BROS., Ltd.,

Dear Sirs:—It is a pleasure for me to say that the chains made by you and used on the world's tour have given perfect satisfaction, never breaking. They have carried us over New Zealand's mountains, the bad roads of Australia, and through many countries. The set sent you herewith has been used for 8,000 miles

Very truly yours,
(Signed) CHAS. J. GLIDDEN.

Weight of car, baggage and passengers, 4200 lbs.

The Celebrated BRAMPTON CHAIN

Made from self-hardening steel. The strongest chain in the world. Note heavy chamferred side plates. This chain is polished as smooth as a looking glass, and fits and revolves on sprockets without friction.

We are sole United States agents for this line of chains, and are ready to quote manufacturers on American standard sizes at same price as American made chain.

We are now appointing exclusive agents for these chains where we are not represented. Prices same as other chains. Write for Agency.

GEO. P. MOORE CO., Inc.

Pacific Coast Agents.

Catalogue mailed on request

CHARLES E. MILLER, MANUFACTURER, JOBBER, EXPORTER and IMPORTER

HOME OFFICE: 97-99-101 Reade St., New York City

BRANCHES:—Broadway and 38th St., New York. 318 and 320 N. Broad St., Philadelphia, Pa. 202 and 204 Columbus Ave., Boston, Mass. 406 Erie St., Cleveland, O., 824 Main St., Buffalo. 227½ and 229 Jefferson Ave., Detroit.

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In Exchange for Stock
in Company

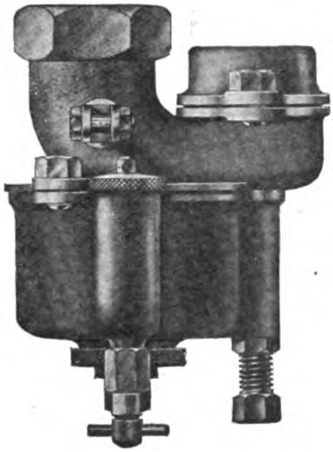
A great opportunity for automobile or parts makers. This factory has most recent modern and highest grade construction and equipment and not a single tool over a few years old. Completely equipped with individual motor drive. Electric traveling crane, R. R. track into building. Size of factory 100 x 130 ft.; ground 130 x 300 ft., and more available. Location within 10 minutes of business center of largest manufacturing center south of Baltimore.

Factory in A 1 condition and now running on unprofitable product. Favorable terms to induce establishment of automobile industry.

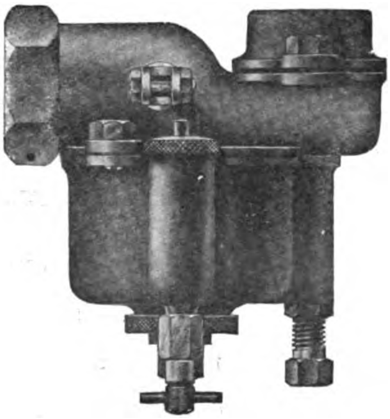
ADDRESS
Factory
care of Cycle and Automobile Trade Journal,
Philadelphia.

Kingston Line

KINGSTON CARBURETOR—Type KC



Vertical Outlet



Horizontal Outlet

This Carburetor has a **CENTRAL FLOAT-CHAMBER** in which is fitted a hollow **COPPER FLOAT** which is seamless; through levers this operates a weighted float-valve placed on one side of float-chamber. The spray nozzle is located in center of float-chamber and is adjustable by needle-screw.

The normal air opening is also through the center of float-chamber, which opening is adjustable and so arranged as to form a positive starting device. An auxiliary air-valve is also provided with an adjustable spring tension. The valve is of metal, is light and rests on a leather seat and is fitted with a flanged vertical inlet for drawing warm air.

This carburetor is fitted with a piston-throttle of the balanced type, is noiseless and perfectly automatic. Either vertical or horizontal outlet opening will fit any motor in any place. This is, we believe, the finest made carburetor on the market, must be seen to be appreciated. A trial will convince you.

Prices of Kingston Carburetor, Type KC

1	In. Pipe Size, either Vertical or Horizontal outlet	$12.00
1¼	" " " " " " " "	13.00
1½	" " " " " " " "	14.00

KINGSTON MUFFLERS

KINGSTON
MUFFLER & CUT-OUT
COMBINED
PAT. PENDING

KINGSTON
MARINE MUFFLER
PAT. PEND.

Byrne, Kingston & Co., Kokomo, Ind., U. S. A.

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CANADA BRANCH

John Millen & Son
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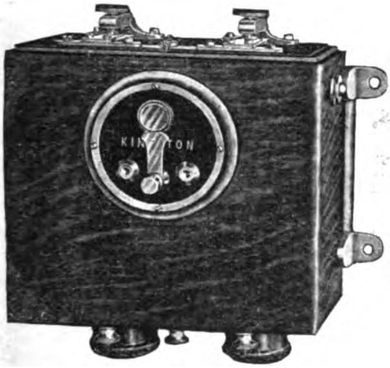
For Sale by all Leading Jobbers Get Catalog No. 24 for Prices on Full Line.

Kingston Line

Kingston Spark Coils



Kingston Spark Plug

As good a plug as can be purchased at any price

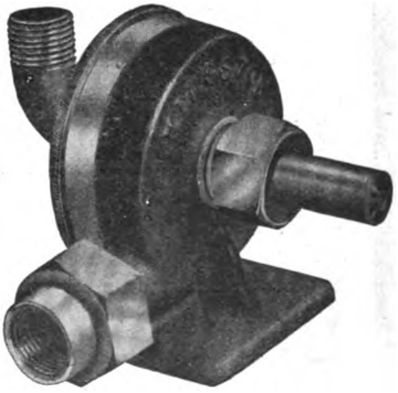
Furnished with either porcelain or mica cores which are inter changeable.

PRICES

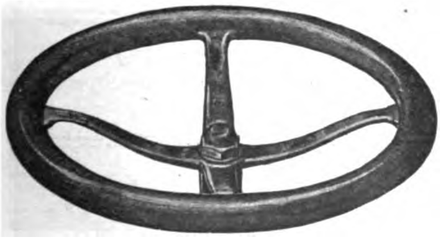
Kingston Spark Plug, porcelain . . . . . $ .75
Kingston Spark Plug, mica 1.50

Buy a porcelain plug, if it does not suit you tell us and we will return your money.

Circulating Pump



Steering Wheels for Automobiles



Byrne, Kingston & Co., Kokomo, Ind., U. S. A.

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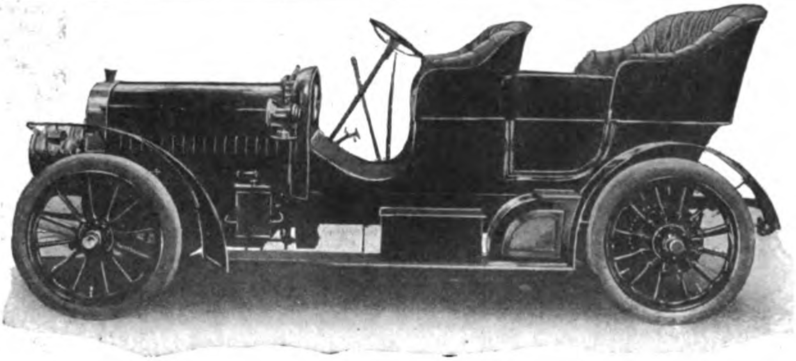
HIGH CLASS TOURING CARS

MADE AND TESTED IN
THE BERKSHIRE HILLS



20-24 H. P., $2500.
30-35 H. P., $3000.

Our latest catalog, B," shows you the details of mechanism, particularly describing the

WONDERFUL BERKSHIRE TRANSMISSION

a type by itself

A quick application will bring you agency proposition for unoccupied territory. Write our Sales Department.

Berkshire Automobile Co.

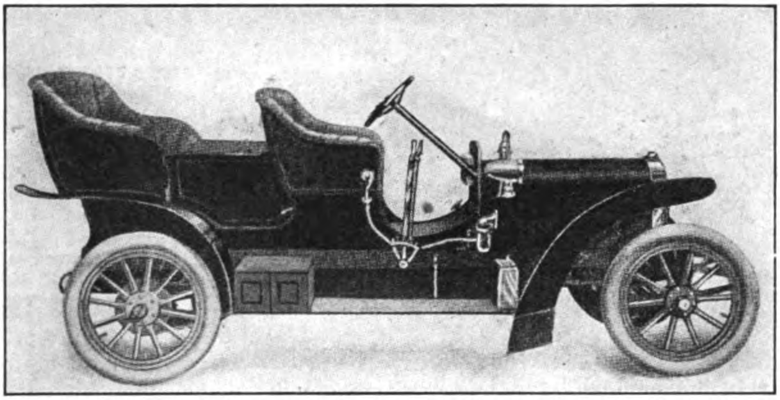
Sales Dep't., General Offices and Factory

Pittsfield, Massachusetts

NEW YORK AGENCY,
1623 Broadway.

BOSTON AGENCY,
Motor Mart, Park Square

BEEBE Model E



30 H. P. **$1250.** **40 miles P. H.**

WATS two stroke cycle engine.
GIANT torqueless friction transmission.
Roller chain drive.
100 in. wheel base.
30 x 3½ quick detachable tires,
Engine started from seat by push button.

Double cylinder 5 x 5.
Three powerful brakes.
Standard track.
Regular equip, Hartford.

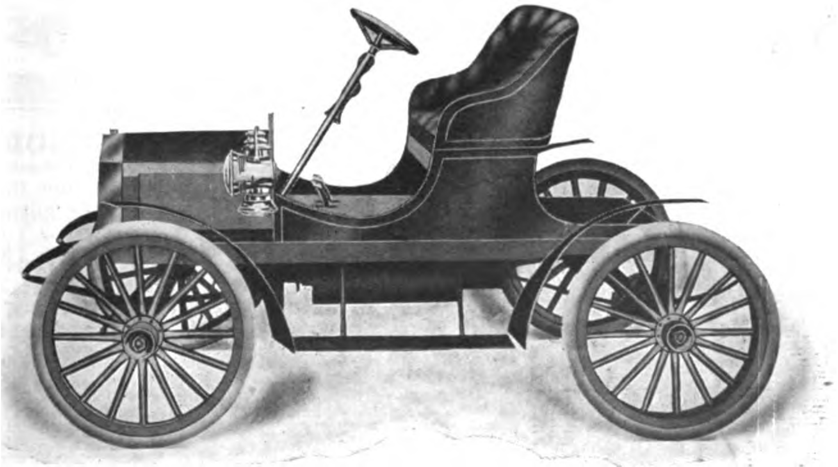
Mr. Man :—

Did you ever grind valves, or break springs, or replace cams, or strip gears? You don't have to stop to think. Well the 4 cycle woods are full of such obstructions. The way out of the forest is with The Beebe.

It will lead you to happiness and contentment.

REMEMBER:—Our two cylinders are equal to 4 four cycle cylinders.

ISSUE No. 3



14 H. P. **$650.** **30 miles P. H.**

.This natty runabout has the same desirable blend of simplified mechanism as its big brother Model E.

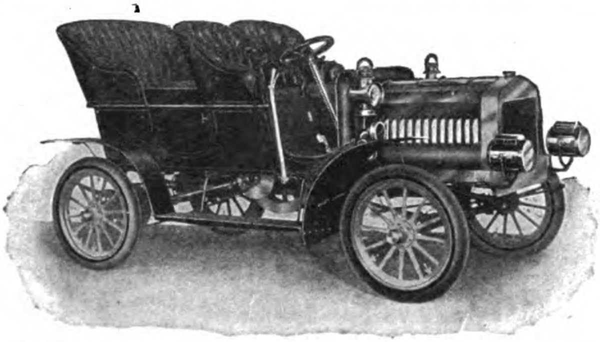
80 inch wheel base.
26 x 1½ solid tires.
Standard track.
Force feed lubrication.

Would you rather work or own a BEEBE?
Look the field over carefully and you will be convinced we have the goods.

WESTERN MOTOR TRUCK AND VEHICLE WORKS,

CATALOG? **Chicago** **AGENTS!!!**

THE GALE 1906



FAULTLESS

ARTISTIC

SURE

TRUSTY

MODEL E: DETACHABLE TONNEAU. Any standard tires. Gas head lights, oil side lights, oil tail light, dash horn, tool kit, ironed for top. Price, $1250.00.

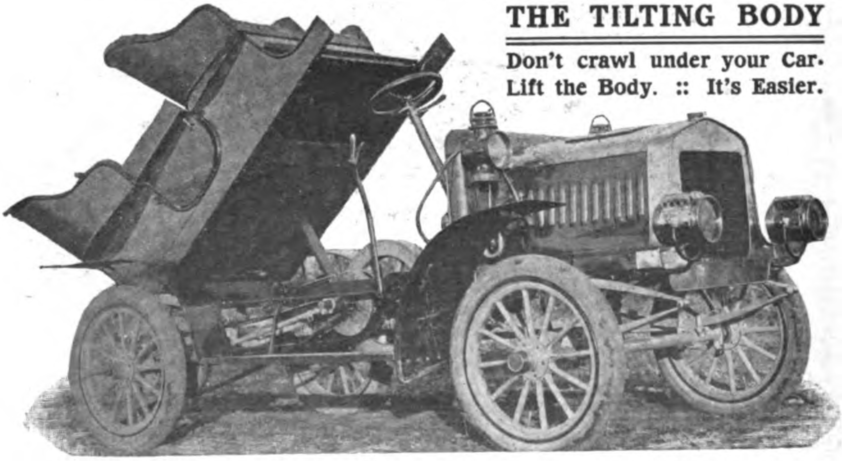
MODEL F: Same as Model E, but with cape cart top, curtain and apron. Price, $1325.00.

SPECIFICATIONS: 18 H. P. Double opposed 5x5 motor, with Hill Precision oiler. Heavy spur gear planetary transmission; single heavy chain drive, to large live rear axle. Ratchet retained double external hub band brakes. Good road clearance, metal dash and running boards. 15 gallon fuel tanks. 92" wheel base, 56" tread; weight, 1700 lbs. Full tool kit and tilting body.

GALE

THE TILTING BODY

Don't crawl under your Car.
Lift the Body. :: It's Easier.

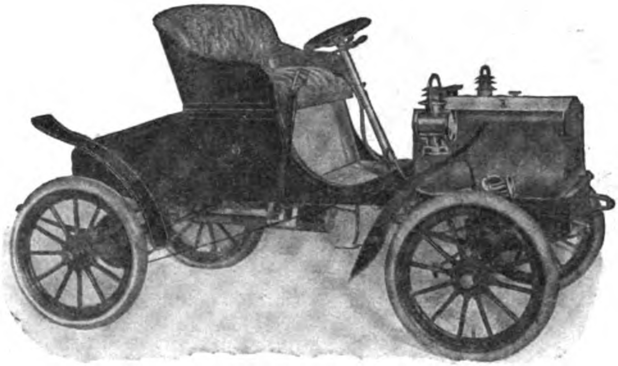


THE WESTERN TOOL WORKS

GALESBURG, ILL.
U. S. A.

THE GALE 1906

SUPERIOR
USEFUL
RELIABLE
ELEGANT



MODEL C: 8 H. P. Any standard tires. Oil side lights, dash horn. Price $600.00.
MODEL D: Same as Model C, but with top curtains and storm apron. Price $650.00.

SPECIFICATIONS: 8 H. P. Single Horizontal 5x6 motor, with large single lubricator. Spur gear planetary transmission, single heavy chain drive, to large live rear axle. Ratchet retained external band brake. Good road clearance; 5 gallon fuel tanks; 73″ wheel base; 54½″ tread; weight, 1100 lbs., **and tilting body.**

GALE

THE TILTING BODY

¶ All models of "The Gale," as well as other autos, have the usual trap-door openings through which the operator can make simple adjustments; but in case of thorough inspection of the working parts of other cars, a person is compelled to do the *crawling* act.

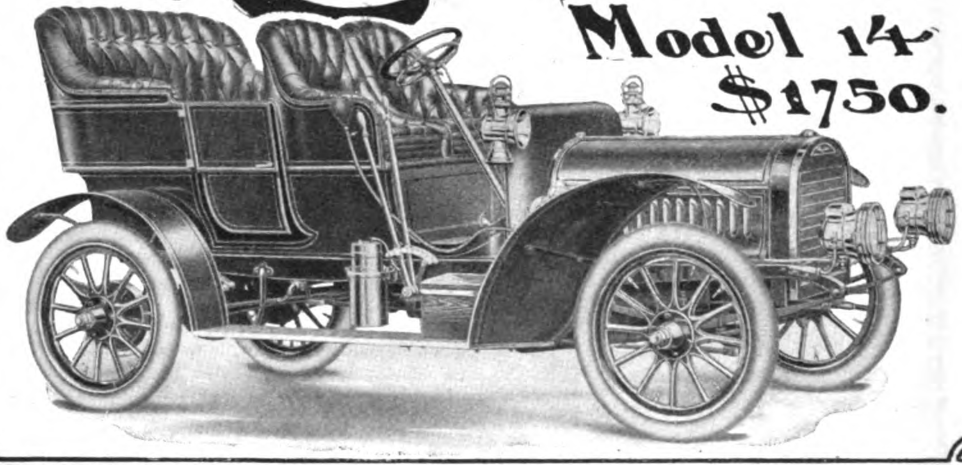
Did you ever experience the strange sensation of crawling under your car and lying upon your back while the black drops of cylinder oil trickled down upon your clothes and face? Most every owner of an automobile has gone through with it—except the owner of "The Gale." He knows a good thing when he sees it. He knows that inspection of the working parts of his car is nothing to him. It simply means: lift the body on its rear hinges; push the supporting rod in place; and then the rest is pleasure. On a hot summer day he stands in the shade of the tall body and really enjoys the inspection of the parts. Then, when all is ready, he lowers the body, springs into the machine, and is off again. No wonder he likes "The Gale." No wonder he laughs at his neighbor who owns one of the old-fashioned machines. That tilting body feature is but one secret of the success of "The Gale," but that secret alone is enough to make you sell that old car of yours and buy an up-to date "Gale." *Just one more fact:* On "The Gale" touring car the timer and carburetor are so placed that either can be adjusted without tilting the body, or even opening trap-doors. If you have ever run a car, then you know what this means.

THE WESTERN
TOOL WORKS

GALESBURG, ILL.
U. S. A.

Rambler

Model 14
$1750.



The Right Car at the Right Price

A modern touring car of the highest possible quality at every point.

Every ounce of raw material is of the nature best adapted to the requirements of its particular purpose, and is submitted to most rigid tests, in some cases chemical analysis, before using.

The workmanship undergoes a similar rigid inspection, and this, in combination with scientific design, produces a car that is *right* from its inception to the end.

The accessories, such as carburetter, igniting, lubricating and oiling systems, are all the latest and most approved types with many valuable features found only in Rambler cars.

It is only the enormous facilities of the largest and most complete automobile factory in the world that renders possible the production of such a car at such a price, and we cordially invite your most critical inspection that we may prove our claim that it is the *right car* at the *right price.*

Thomas B. Jeffery & Company

Main Office and Factory, Kenosha, Wisconsin.

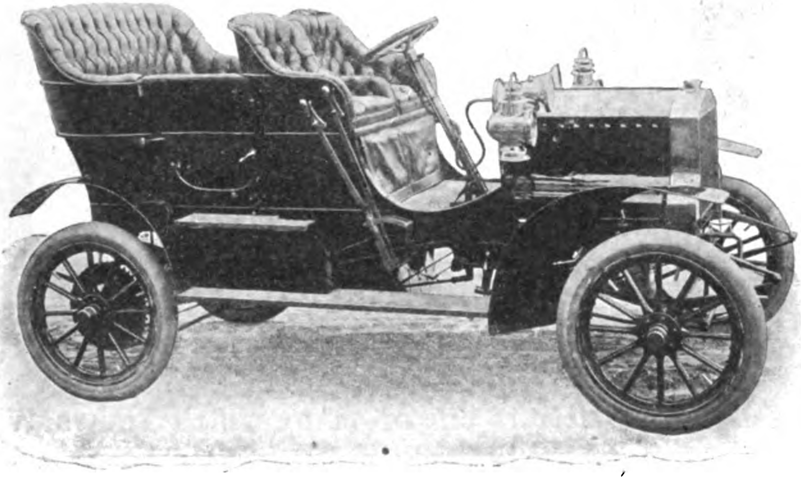
Branches:

Chicago Milwaukee Boston Philadelphia San Francisco
New York Agency, 38 to 40 West 62nd St. Representatives in all leading cities.

THE LAMBERT

The Famous Friction Drive Car

Guaranteed ONE YEAR. This is proof of their superior construction, models and styles to suit the purchaser. Immediate deliveries.



MODEL "5," PRICE $1200

A Low Priced, High Grade Touring Car, Perfectly Equipped and Finished. Write us for our Catalogue of

Pleasure Cars, Runabouts and Touring Cars,

and Commercial Trucks

Prices: $900.00 to $3000.00

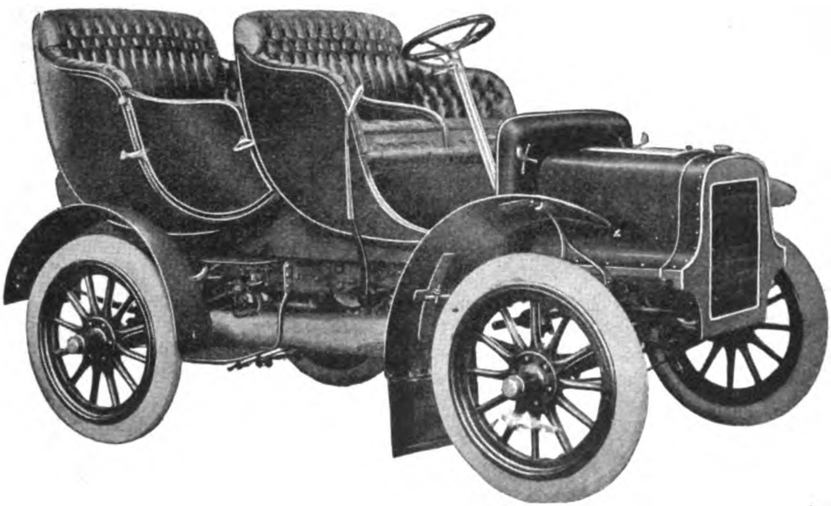
☛ We have a few attractive agency propositions open where we are not represented. **Write for particulars.**

The Buckeye Manufacturing Company
ANDERSON, INDIANA, U. S. A.
Member American Motor Car Manufacturers' Association

CADILLAC Model M

$950.00 F. O. B. Detroit

The worthy successor of our 1905 Model F, of which more were made and sold than two other models combined.



The following letter is one of many which shows WHY

Cuba, N. Y., January 30, 1906

Cadillac Motor Car Co.,
Detroit, Mich.

Gentlemen: September 1st, 1905, I purchased from the Centaur Motor Co., Buffalo, N. Y., one Model F Cadillac. This machine I have used for livery and have made upwards of 2000 miles. It has not caused one moment of trouble or one cent for repairs. It has made all the hills in this section, which are very bad, with perfect ease, no matter what the load might be. When I purchased the machine I did not know any more about it than a boy of ten years, but found it to be very simple in every detail.

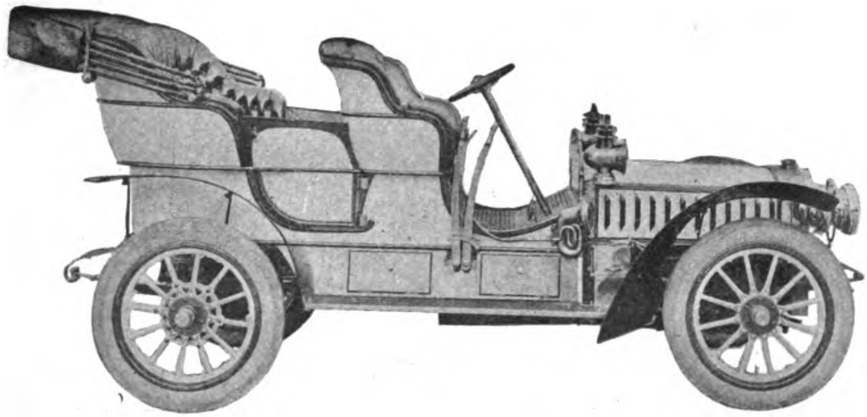
I cannot speak too highly of the Cadillac. It is certainly a winner.

Respectfully,
F. L. HALLACK

Is it any wonder that Cadillacs sell?

CADILLAC MOTOR CAR CO., DETROIT, MICH.

Members Association Licensed Automobile Mfrs.



60 H. P. 1906 MODEL

AUSTIN

Special Features:

Our complete double ignition system—two sets of spark plugs—magneto and non-vibrating coil on one set, batteries and vibrating coil on the other.

Sliding gear transmission, selective type, FOUR forward speeds.

New device for changing gear—especially easy to operate—and our new interlocking system absolutely prevents any wrong manipulation.

Austin Spring Controller—enables the car to be driven at high speed, over rough roads, without jolt or jar.

A beautiful, powerful, speedy and exceptionally well built car.

Large wheels (36" x 4½") and exceptionally high road clearance.

We manufacture more of the complete car in our own factory than any other maker in the United States, which enables us to guarantee the strength, quality and workmanship of every part.

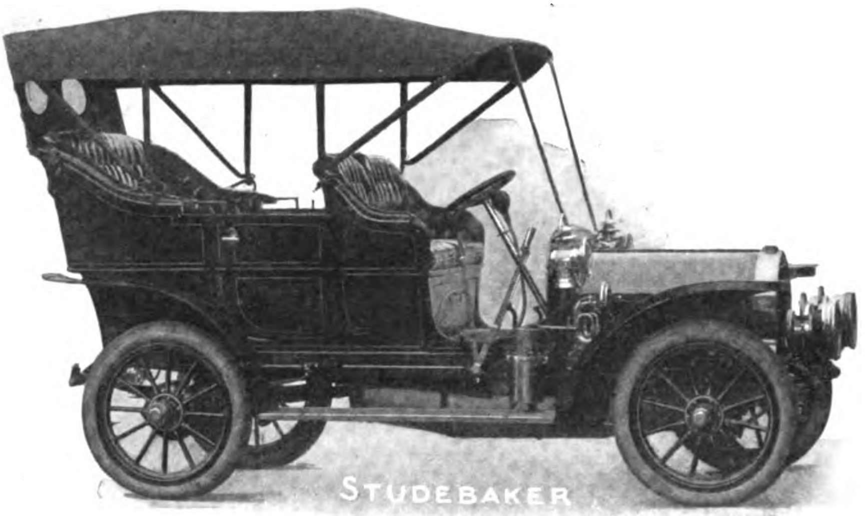
Write for catalogue which gives complete details.

AUSTIN AUTOMOBILE CO.
GRAND RAPIDS, MICH., U. S. A.

New York Agent,
Frank A. Sanford, 1843 Broadway

STUDEBAKER

Automobile for 1906



Model F Touring Car, 28-32 H. P. Price $3,000

NOW that the great automobile shows of New York and Chicago are at an end, thousands of prospective buyers are debating the salient points of one car as compared with another; doubtless wondering in greatest perplexity why each enthusiastic salesman insists upon the fact that his car is the best.

Permit us to suggest that in regard to extreme accuracy and scientific painstaking in both design and construction there is little or no material difference between the products of several of the more reputable and substantial builders. The buying public has but one great, important consideration to fall back upon—**reputation.** The first and last essential in automobile buying is the **reputation** of the manufacturer back of the machine.

We believe the Studebaker equal to any car offered. We know that its design is up to date and that its construction is thorough. We offer the most liberal guarantee based upon this knowledge.

Catalogue and detailed information direct or through our nearest agency will be furnished with pleasure upon inquiry.

Studebaker Automobile Co., South Bend, Ind.

Members Association of Licensed Automobile Manufacturers

Selling Agencies

Boston, Mass., Harry Fosdick Co., 51-58-55 Stanhope St.
Cleveland, Ohio, Central Automobile Co., 409 Erie St.
Pittsburg, Pa., Banker Bros. Co., Baum and Beatty Sts.
Philadelphia, Pa., Litman Leeds & Co., 1227 Market St.
Washington, D. C., National Automobile Co., 1711-18 14th St.
Louisville, Ky., Fitch, Miller & Co., 411 Keller Bldg.
Altoona, Pa., W. H. & L. C. Wolfe, 1011 Chestnut Ave.
Rochester, N. Y., Rochester Automobile Co., 150 South Ave.
Buffalo, N. Y., National Battery Co.,
Cincinnati, O., Hanauer Automobile Co,, 118 E. 7th St.
Erie, Pa., C.R. Dench, Erie Fireproof Garage, 12th and State Sts.
Los Angeles, Calif., W. G. Nevin, Hellman Bldg., Corner 4th and Spring Sts.

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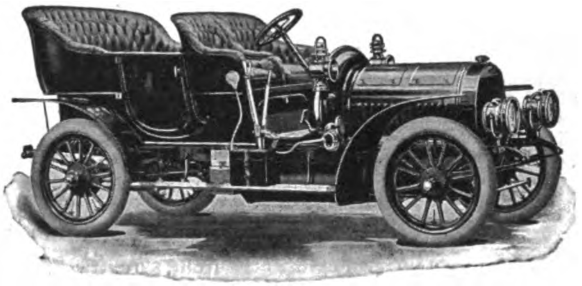
Chicago, Ill., Studebaker Bros. Mfg. Co., 378-388 Wabash Ave.
San Francisco, Cal., Studebaker Bros. Co. of California, Cor. Market and Tenth Sts.
Kansas City, Mo., Studebaker Bros. Mfg. Co., 810-814 Walnut St.
Portland, Ore., Studebaker Bros. Co. Northwest, 328 836 E. Morrison St.
Salt Lake City, Utah, Studebaker Bros, Co., of Utah, 157-159 State St.
Denver, Colo. Studebaker Bros. Mfg. Co., Cor. Fifteenth and Blake Sts.
Dallas, Tex., Studebaker Bros. Mfg. Co., 317-319 Elm St.



IT IS NOW WELL KNOWN

that

THE ROYAL TOURIST

is the most reliable and most economical motor car built anywhere. If you care to confirm this statement

ASK AN OWNER OF A

ROYAL

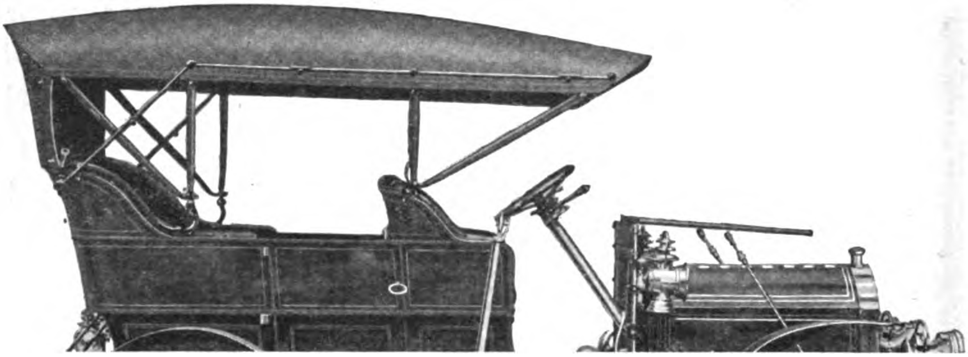
THE ROYAL MOTOR CAR CO.

CLEVELAND, O.

AGENTS

The McDuffee Automobile Co., Chicago. C. A. Duerr & Co., New York. G. J. Dunham Boston. G. W. Caplin, Minneapolis. Automobile & Supply Co., Lim., Torontc. Motor Shop, Philadelphia. Reyburn Motor Car Co., St. Louis. Standard Automobile Co., Pittsburg. Amos-Pierce Auto Co., Syracuse. Schoeffel Co., Rochester. Royal Motor Car Agency, San Francisco.

Member A. L. A. M.



This is the Pierce Great Arrow 28-32 H. P. with straight tonneau body, cape top and folding glass front. Price without top or glass front, $4,000. Cape Top, $200 extra. Folding glass front, $50 extra.

THE PIERCE ARROW

is a car whose final destination is neither the scrap heap nor the machine shop. There are probably more Pierce Arrows of old models now in satisfactory use than any other make of car. A Pierce Car of several years back is a better investment than many 1906 cars.

The greatest obstacle to the ownership of an auto to many people is the cost of maintaining—not the ordinary garage charges, but the far greater expense of repairs, adjustments and the like. Even if you do not mind the cost of these, the annoyance and delay when a car breaks down takes away from the pleasure of operating it.

In the famous Glidden Trophy run the Pierce Arrow went one thousand miles without a single adjustment. More than that, it did not require an expert chauffeur or mechanic to do this. The performance can be duplicated by any American gentleman with a Pierce car.

If you are interested, we will send booklets and technical descriptions.

THE GEORGE N. PIERCE COMPANY, Buffalo, N. Y.

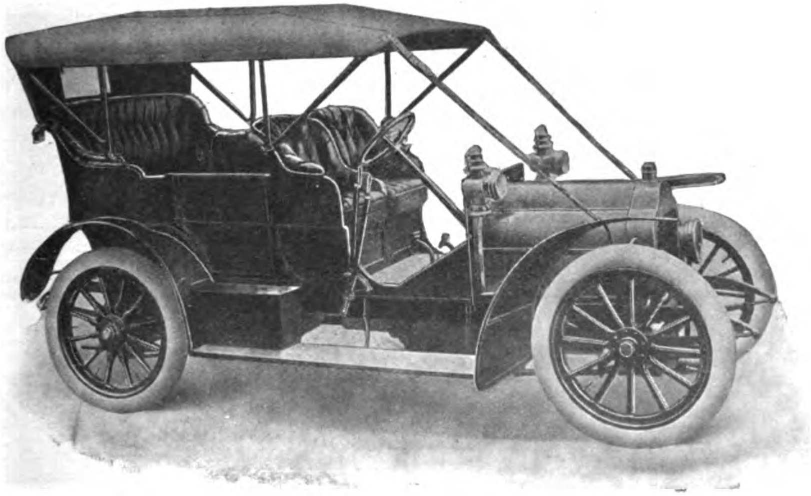
Members Association Licensed Automobile Manufacturers

LIST OF DEALERS

BALTIMORE, MD.—Southern Auto Co., 2021 Maryland Ave.
BOSTON, MASS.—J. W. Maguire Co., 746 Boylston St.
BUFFALO, N. Y.—The George N. Pierce Co., 752 Main St. (Retail).
CHICAGO, ILL.—H. Paulman & Co., 1321 Michigan Ave.
DENVER, COLO.—The George N. Pierce Co., 1643 California St.
DETROIT, MICH.—J. P. Schneider, 189 Jefferson Ave.
GENEVA, N. Y.—J. A. Place.
HARTFORD, CONN.—The Miner Garage Co., 120 Allyn St.
HOUSTON, TEX.—Hawkins Auto & Gas Engine Company.
KANSAS CITY, MO.—E. P. Moriarty Co. 1612 Grand Ave.
LOS ANGELES, CALIF.—Bush & Burge, Cor. 7th and Main Sts.
LOUISVILLE, KY.—The Zorn-Strauss Co., Inc.
MILWAUKEE, WIS.—Hibbard Automobile Company.
MONTREAL and OTTAWA—Wilson & Co., 142 Bank St.
NEW YORK, N. Y.—Harrolds Motor Car Co., Broadway, 28-29th Sts.
OAKLAND, CAL.—The George N. Pierce Co., 1013 Clay St. (Wholesale).
PHILADELPHIA, PA.—Foss-Hughes Motor Car Co., 201 N. Broad St.
PITTSBURG, PA.—Banker Bros. Co., Baum and Beatty Sts.
PORTLAND, ME.—J. A. Dowling.
PORTLAND, ORE.—Covey & Cook Motor Car Co.
PROVIDENCE, R. I.—The Shepard Company.
ROCHESTER, N. Y.—U. S. Automobile Co., 21 Plymouth Ave.
ST. LOUIS, MO.—Western Auto Co., 4701 Washington Boulevard.
ST. PAUL, MINN.—C. P. Joy Auto. Co., 368 Minnesota St.
SAN FRANCISCO—Mobile Carriage Co., Golden Gate Ave. & Gough St.
SARATOGA SPRINGS, N. Y.—W. L. Hodges, 16 Woodlawn Ave.
SCRANTON, PA.—Standard Motor Car Co.
SEATTLE, WASH.—Broadway Auto Co.
SHEFFIELD, PA.—C. H. Smith Co., Ltd.
SPRINGFIELD, MASS.—E. H. Clark Auto Co., 117 Lyman St.
SYRACUSE, N. Y.—Amos-Pierce Auto Co., 109 S. State St.
TITUSVILLE, PA.—A. E. Lambert.
TORONTO, ONT.—Auto & Supply Co., Ltd., 24 Temperance St.
TROY, N. Y.—Troy Auto Exchange, 22 Fourth St.
UTICA, N. Y.—Utica Motor Car Company.

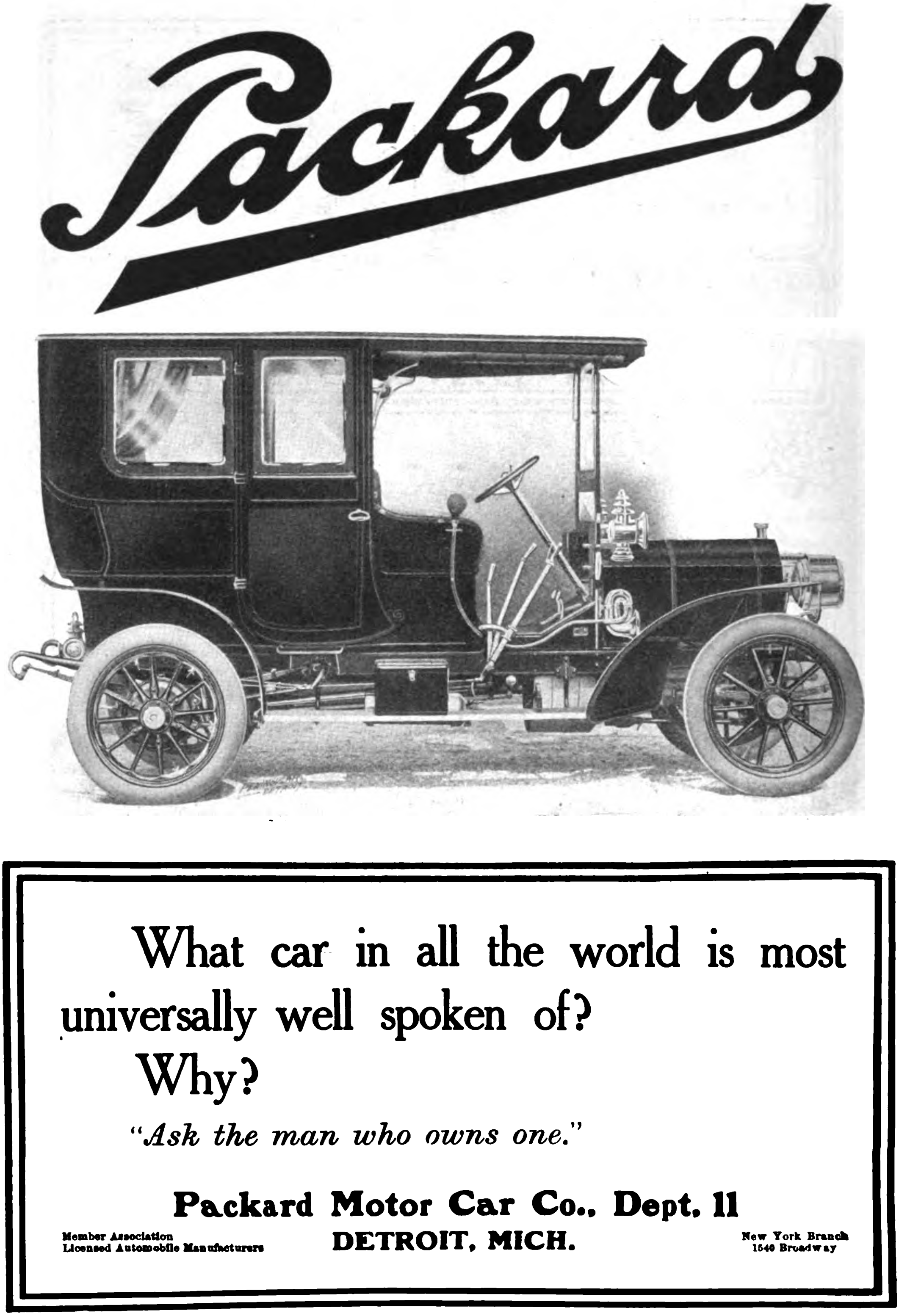
BLISS

BUILT BY E. W. BLISS CO.



30 H. P.
The Finest American Motor Car

DOUGLAS ANDREWS,
SELLING AGENT. 1623 BROADWAY, N. Y.



Packard

What car in all the world is most universally well spoken of?

Why?

"Ask the man who owns one."

Packard Motor Car Co., Dept. 11

DETROIT, MICH.

Member Association
Licensed Automobile Manufacturers

New York Branch
1540 Broadway

WATCH FOR THE ROUND RADIATOR

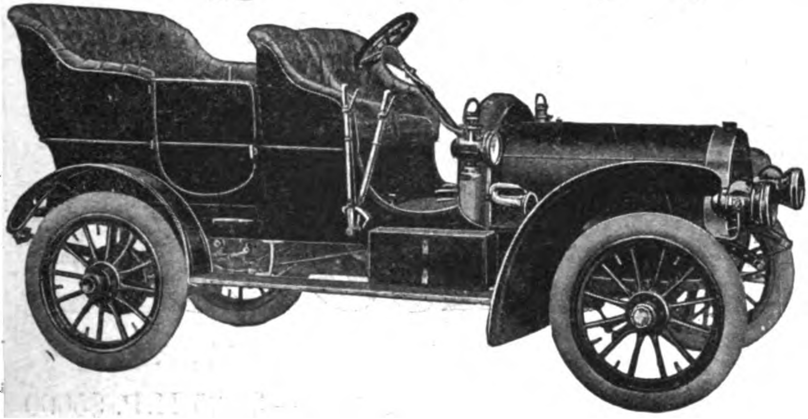
National

RELIABILITY

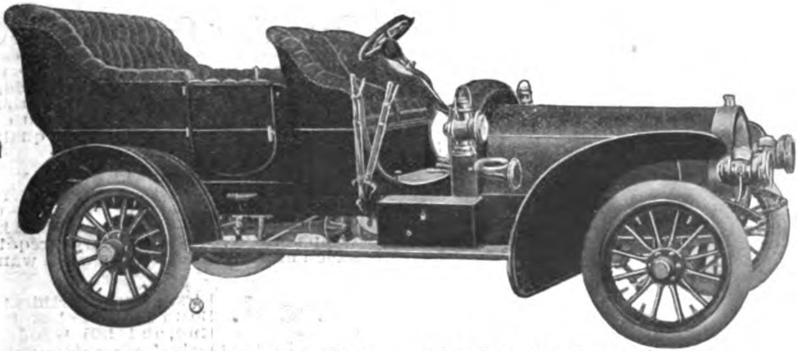
Was demonstrated in the most convincing manner at Indianapolis on November 16 and 17, 1905, when a **NATIONAL STOCK CAR** made

$1094\frac{3}{16}$ Miles in 24 hours

Breaking the world's record by $78\frac{9}{16}$ Miles



The Car that Broke the World's Records



An Innovation in Touring Cars

National Model E, 6 cylinder. 50-60 H. P. Price, $4000

Stylish, powerful, smooth running, easily controlled. Aluminum body, seats 7 passengers comfortably, **all facing forward.**

Write for Particulars

National Motor Vehicle Co. 1003 E. 22nd Street
Indianapolis, Ind.

National Distributers—Linscott Motor Co., 163 Columbus Ave., Boston; Homan & Schulz Co., 134 W. 38th St., N. Y. City; Ralph Temple Auto Co., 311 Mich. Ave., Chicago; Tioga Auto Co., Broad and Tioga Sts., Phila.; Liberty Auto Co., 138 Beatty St., E. E. Pittsburg; National Motor Car Agency, 705 S. Main St., Los Angeles, Cal.; Fawkes Auto Co., Minneapolis and St. Paul; Robt. F. Boda & Co., 68 E. Noble St., Columbus, O.; Colonial Auto Co., 3944 Olive St., St. Louis, Mo.; McKinley Motor Car Co., Rochester, N. Y.; Fisher Auto Co., 330 N. Ill St., Indianapolis, Ind.; F. E. Boland Motor Co., Newark, N. J. Member American Motor Car Manufacturers Ass'n., Chicago.

Locomobile

"EASILY THE BEST BUILT CAR IN AMERICA"

15-20 H.P. $3000—**The highest-priced American Car but the cheapest in the end**—30-35 H.P. $5000

Design. The first gasolene *Locomobile* had four cyl. motor, enclosed timing gears (no fibre), gear-driven electrical generator, gear-driven centrifugal pump, sliding gears direct drive on high gear, etc. The 1906 *Locomobile* is the result of continuous, consistent development of the correct type of touring car. Second year of make-and-break ignition, with low-tension magneto, the simplest and best system known.

Materials. All metals specially selected and subjected to physical analysis and chemical test ever since 1902, when we began to manufacture gasolene cars. Unequaled experience and facilities applied to the handling of special steels.

Construction. An inspection and trial of the original *Locomobile*, with original parts, now at our factory and run for thousands of miles, should convince you of the high character of *Locomobile* construction.

Running Qualities. The best running car is the one which wears the best and is the most reliable. Whereas many cars depreciate rapidly, it is conspicuously true of the *Locomobile* that it tends to improve with age. A short demonstration is no test of quality.

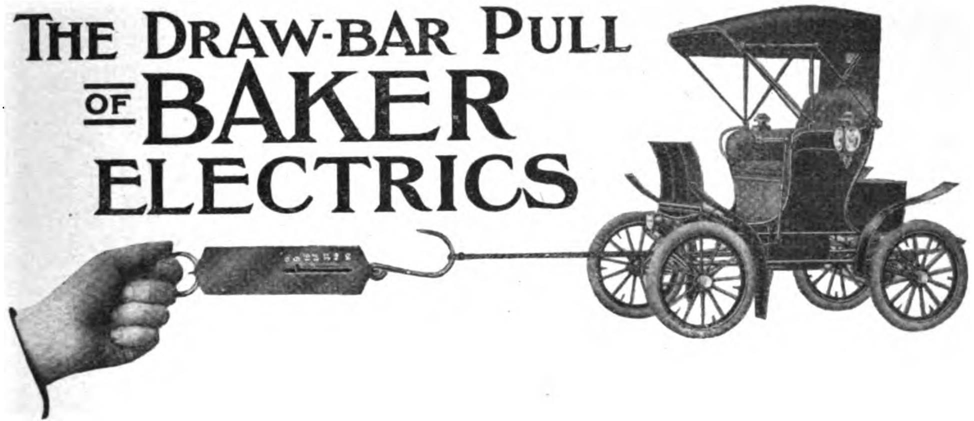
Reliability. Used by the N. Y. Fire Department, N.Y. Water Department, St. Louis Fire Department, Southern New England Telephone Co., and others who require cars which must be ready for use when wanted.

Record. First-class certificates 1902 Boston Run, 1903 Pittsburg Run, and 1905 Glidden Tour. Dr. H. E. Thomas's *Locomobile* defeated 12 foreign racers in the 1905 Vanderbilt Race—the finest performance ever made by an American car. **12 different souvenir postal cards showing the Locomobile in the Vanderbilt Race mailed for 12c. in stamps; five-color poster of the Locomobile finishing in the Vanderbilt Race mailed for 10c. in stamps.**

The *Locomobile* Company of America, Bridgeport, Conn.

New York, Broadway and 76th St.
Philadelphia, 249 N. Broad St.
Boston, 15 Berkley St.
Chicago, 1354 Michigan Ave.

Member Association of Licensed Automobile Manufacturers



Draw Bar Pull

WHEN someone tells you that the "DRAW BAR PULL" of an automobile is so and so, of course you know he refers to the number of pounds of energy required to move the automobile over a level surface like asphalt.

The Draw Bar Pull of an automobile is the real test of efficiency, in other words, shows how easily it runs.

The Draw Bar Pull of **BAKER ELECTRICS** is one-half that shown by actual tests of other automobiles.

That is why the BAKER STANHOPE is equipped with only a twelve cell battery while others of similar type require batteries of twenty-four or more cells yet give no better service in any particular. Why buy an electric with a large battery equipment when half the battery will do the work equally as well? Remember—the more battery the greater expense, the fewer the batteries the lower the cost to maintain, the less care the smaller expense in the eventual replacement of battery plates.

The greater the mechanical energy required to operate a motor car, the greater the weight required, and this means less satisfactory service, more wear and tear.

The workmanship in **BAKER ELECTRICS** is the finest, the materials the best that money can buy. Every working part moves on a ball bearing. This insures utmost efficiency with the least possible motor strain. It insures satisfactory service at the lowest possible maintenance cost and practically no expense for repairs.

Every **BAKER** vehicle exhibits this same low "DRAW BAR PULL," and the same high rate of efficiency.

All **BAKERS** are superbly finished in the finest style of the carriage maker's art and the upholstery is the choicest. These are a few of the reasons that have prompted **BAKER** owners to call them

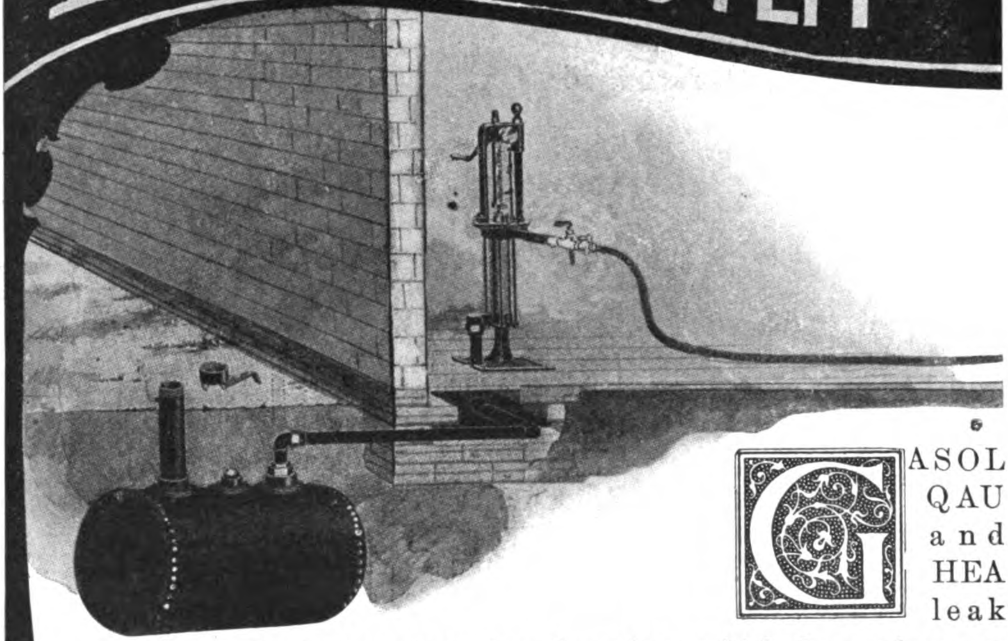
THE ARISTOCRATS OF MOTORDOM

Represented in all cities. Ask for Catalogue. **IMPERIALS, STANHOPES, SUBURBANS, SURREYS, DEPOT CARRIAGES, BROUGHAMS** (interior and exterior driven).

The Baker Motor Vehicle Co.,

18 JESSIE ST., CLEVELAND, OHIO

THE BOWSER SYSTEM



GASOL
QAU
and
HEA
leak
easily filled when desired, and one from which the gasolene can
tion with a pump built of highest grade material and so con
ant that you secure an outfit in which gasolene can be kept
to the minimum; also, that you use an outfit which will pre
—which you should have for use in your machine. ¶ Does
provides the most convenient method ever devised for the stor
is to reduce the fire risk to the minimum. This is assured if

Bowser Long Distance

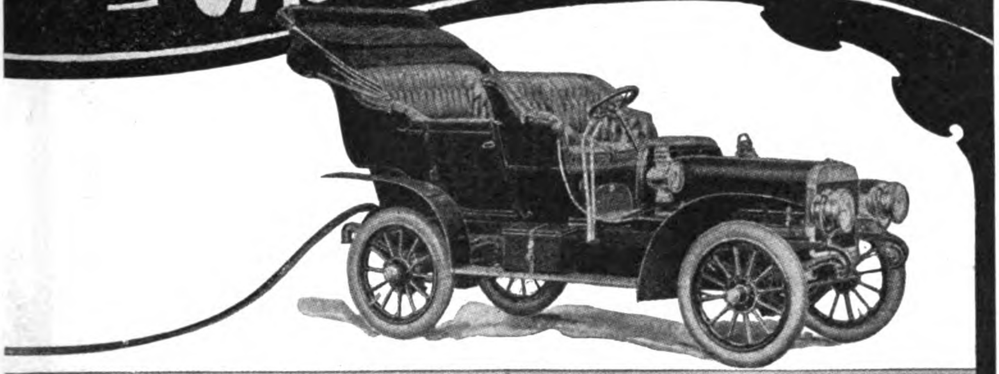
IT IS ABSOLUTELY

Gasolene is buried any desired distance from the building. Bo
ous gases permeating the atmosphere, as the the gasolene is
never exposed to the air. Self measuring outfits for use
There are Many Other Reasons Why You

S. F. BOWSER &

EASTERN OFFICE: 255 AT

OF GASOLENE STORAGE



ENE, to be safely handled, TO RETAIN ITS VITAL LITIES—to meet the requirements of insurance companies fire boards, SHOULD BE KEPT IN AN UNDER GROUND, VY GALVANIZED STEEL TANK, riveted and soldered; proof; corrosion proof; one arranged to prevent pilfering, to be readily be drawn. ¶ The gasolene should be drawn by sucstructed as to meet the most severe tests. ¶ It is very importin the safest manner possible, i. e., that the fire risk be reduced vent evaporation. Evaporation means spent power—lost energy convenience appeal to you? If so, use a Bowser Outfit. It age of gasolene. ¶ Another main essential in storing gasolene you use a

Gasolene Storage Outfit

SAFE BECAUSE

th tank and pump are absolutely evaporation proof. No danger- pumped directly into the reservoir of automobile, and so is in garages. Smaller, less expensive ones for private use. Should Use It. Write for catalog J; it's free.

CO., Inc., FORT WAYNE IND.

LANTIC AVE., BOSTON, MASS.

"NO HILL TOO STEEP—NO SAND TOO DEEP"

THE MARVELOUS POPULARITY OF

"JACKSON" Cars

——is due to:——

THEIR EASY RIDING QUALITIES—

THEIR WONDERFUL HILL CLIMBING POWER—

THEIR STAUNCHNESS AND ENDURANCE—

Their wide range of speed and ease of control.

Their superb finish, graceful lines, luxurious trimming, and complete equipment.

And, last but not least, the prompt, courteous and liberal treatment which the manufacturers believe is due both to the dealer and the consumer.

THREE STYLES

4-Cylinder	2-Cylinder	2-Cylinder
$2,500	$1,500	$1,250

AGENCIES:

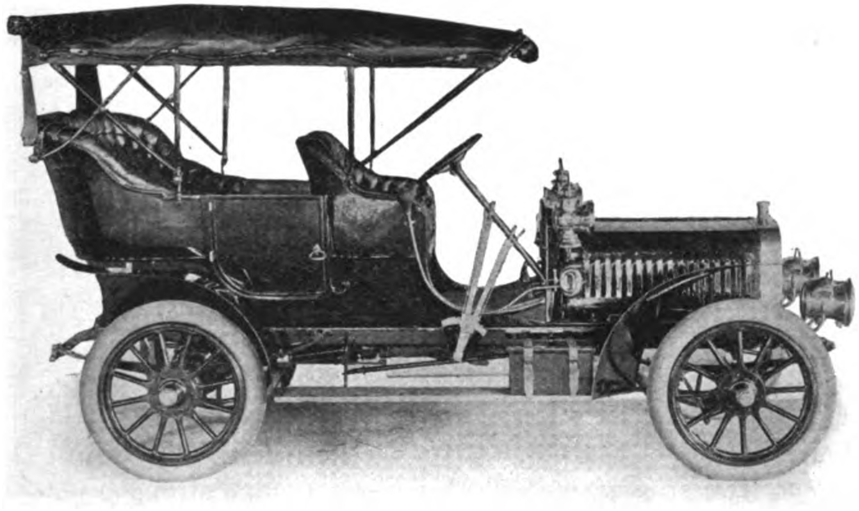
E. P. Blake Co., 15 Hawkins st., Boston, Mass.
Gotham Automobile Co., 1655 Broadway, New York City.
Diamond Motor Car Co., 2121 N. Broad st., Philadelphia, Pa.
Ormond Automobile Co., Jefferson ave. and Ormond pl., Brooklyn, N. Y.
The Paxson Motor Co., 817 Huron st., Cleveland, Ohio.
East Liberty Automobile Co., 5969 Centre ave., Pittsburg, Pa.
Hagmann & Hammerly, Harrison and Oakley bldg., Chicago, Ill.
Seidler-Miner Automobile Co., 244 Jefferson ave., Detroit, Mich.
A. W. Gump Automobile Co., 1118-1120 S. Main st., Los Angeles, Cal.
St. Louis Motor Car Co., 3685 Olive st., St. Louis. Mo.
C. R. Dench, 12th and State sts., Erie, Pa.
Park Automobile Co., Baltimore, Md.
Motor Car Company, 209 S. Fifth st., Minneapolis, Minn.
Sioux Falls Auto and Supply Co., Sioux Falls, S. D.
The Monte Vista Motor Car Co , Monte Vista, Colorado.
Essex Automobile Co., 9-13 Lombardy st., Newark, N. J.

Jackson Automobile Co.
Jackson, Michigan

1906

MOON

(The honest car)



1906 Moon. Model A

$3000

F. O. B.
St. Louis, Mo.

The Moon is a superior car and will be appreciated by experienced Buyers ::

ENGINE—4-Cylinder Special. 30-35 H. P.
BODY—Most approved type. Seating capacity 5.
FRAME—Cold pressed steel, drop forged spring hangers.
TRANSMISSION—Sliding gear type, 3 speeds forward and 1 reverse; direct on high speed.
DRIVE—Bevel gear. Weight, 2400 pounds. Wheel base, 106″
BRAKES—3; 2 on rear hubs, 1 on transmission.
COOLING—By water. Improved honeycomb radiator with fan.
IGNITION—Jump spark, batteries and coil.
CLUTCH—Improved multiple disk.
TIRES—Front and rear 34″x4″. Speed 3 to 50 miles an hour.

FOR FURTHER PARTICULARS WRITE TO

MOON MOTOR CAR CO., St. Louis, Mo.

TO DEALERS

We have pleasure in calling your attention to our new style Lamps for 1906, shown on opposite page.

All of our Lamps have solid drawn bodies.

The top and bottom of the Lamp are double seamed on to this shell, making the strongest construction possible in stamped metalware. We do not know of any other Lamps as well made in this particular as ours. The socket we use on the side of our Lamps is drawn from heavy sheet brass, and in order to furnish a proper bearing for the screw, we force in a plug of malleable iron which carries the screw. This enables us to have the socket of a symmetrical shape and not clumsy in appearance, and still have the necessary strength for the strain of the set screw. In riveting the socket to the Lamp, we put on the inside a sheet of steel as a reinforcement to the body.

It is needless to say that our Lamps all burn properly. All Dietz Lamps that have ever been made are subject to this statement.

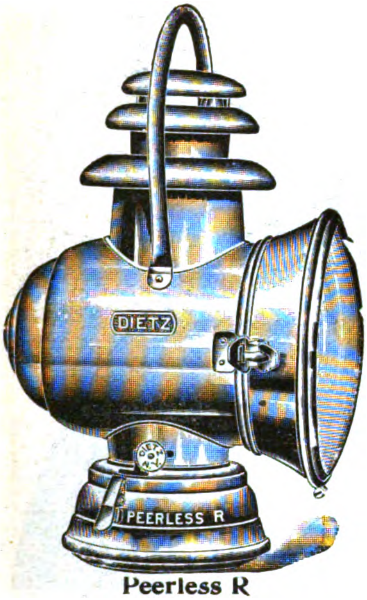
We would esteem it a pleasure to send to any responsible concern a sample pair or pairs of any of the Lamps for examination or trial, at our expense and risk, to be paid for only if finally retained.

R. E. DIETZ COMPANY

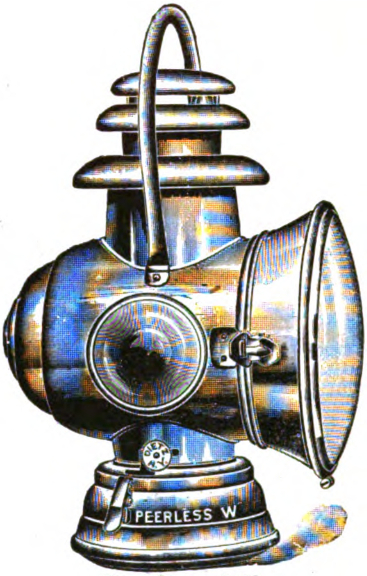
35 LAIGHT STREET NEW YORK, U. S. A.

ESTABLISHED 1840

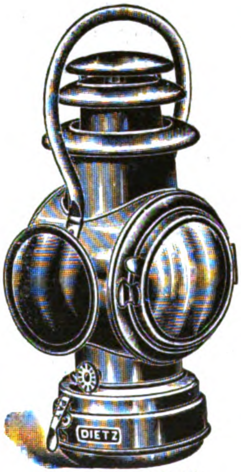
Dietz 1906 Oil Motor Lamps


DIETZ
PEERLESS R

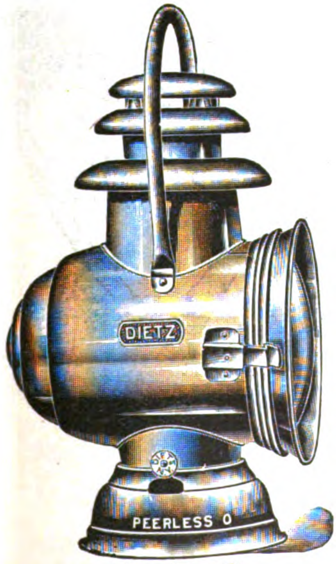
Peerless R
List $7.00 each



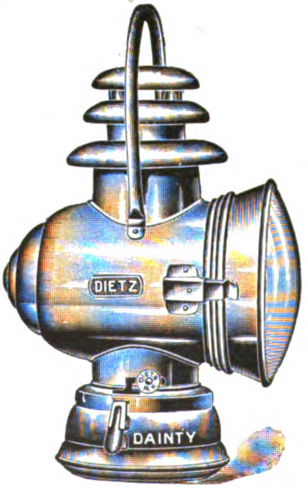
Peerless W
With White, Red or Green Windows. List $8.00 each



Dainty Tail
List $6.50 each


DIETZ
PEERLESS O

Peerless O
List $5.50 each


DIETZ
DAINTY

Dainty Side
List $5.50 each

R. E. DIETZ CO.

35 LAIGHT STREET **NEW YORK**

ESTABLISHED 1840

POPE

Everything in
Modern Automobiles

Pope-Toledos - $2500-$10,000
Pope-Hartfords - $750-$2500
Pope-Tribunes - - - $900
Pope-Waverley Electrics $850-$2250

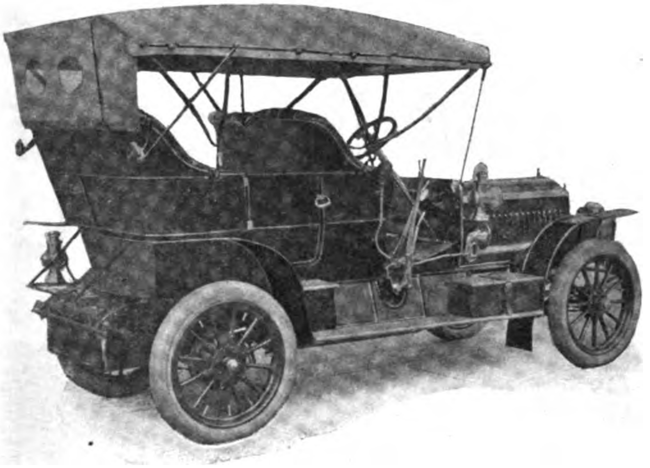
The name bespeaks
the quality

AUTOMOBILES

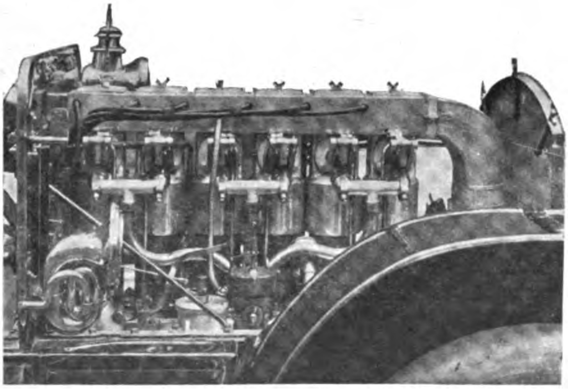
Pope Manufacturing Company
HARTFORD, CONN.
A. L. A M.

FRAYER-MILLER

The Sensational Car of 1905



Properly Cooled By Air



First American Six-Cylinder Car

An Unqualified Success.

TWO MODELS

Four Cylinder, 24 H. P., 2,000 lbs., $3,000. Six Cylinder, 40 H. P., 2,500 lbs., $4,000.
Cylinders, both cars, $4\frac{1}{16}$ x $5\frac{1}{8}$ inches.

RECORDS

3202 Miles in 6 days, 15 hours, 29 minutes. 1866 miles without a stop.

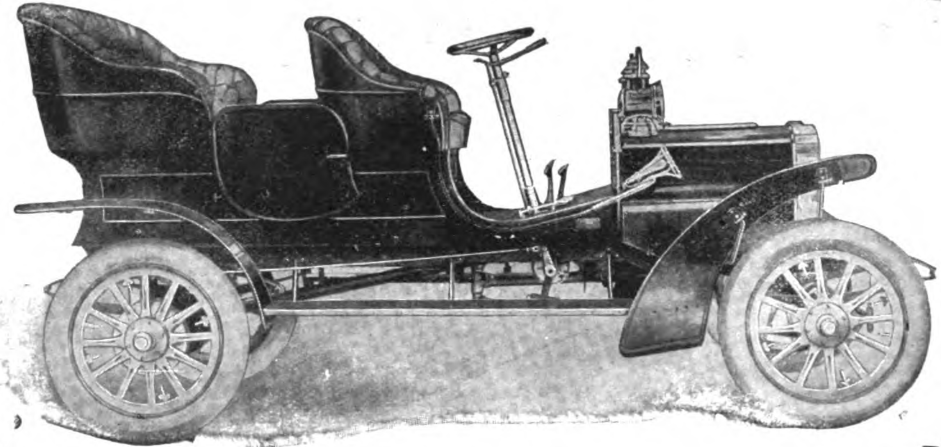
UNBEATEN.

Oscar Lear Automobile Company, Columbus, O.

Frayer-Miller Automobile Co., 941 8th Ave., New York

NORTHERN

The Silent, Dustless Car



The Silent Northern Touring Car

20 H. P., double opposed motor, tires, 30 x 4, seats five passengers comfortably. Price with gas and oil lamp equipment, $1800, f. o. b. Detroit.

The peculiarly simple, strong construction of this car is a positive guarantee of low cost of maintenance, high efficiency and perfect reliability. It is the ideal car for American roads.

Mechanism completely encased—protected from water, dust and mud. All parts quickly accessible. No oil leads. Only three vital points to oil, and the oil-box is so placed that there is a free flow of oil and perfect lubrication, winter and summer.

The Silent Northern is the only dustless car, and has many exclusive original features, which make it the easiest riding car in the world. Investigate.

Send for the New Catalog—illustrates seven distinct 1906 models. Write today.

Northern Manufacturing Co.

Member Association of Licensed Automobile Manufacturers.

DETROIT, U. S. A.

New York City Agent: Peter Fogarty, 142 W. 38th St.

DEFIANCE

WOOD-WORKING MACHINERY

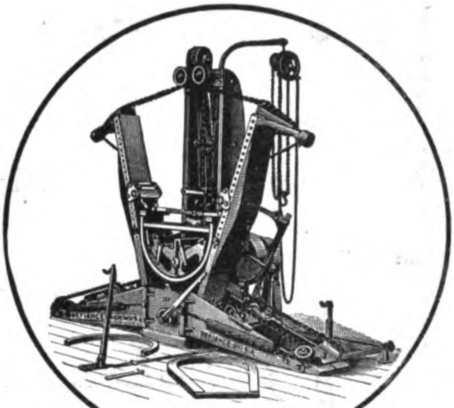
FOR MAKING

AUTOMOBILE WHEELS AND BODIES

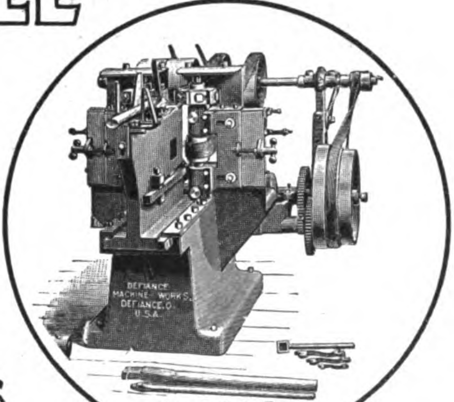
COMPLETE .... EQUIPMENTS OF MODERN HIGH GRADE TOOLS

INVENTED AND BUILT BY

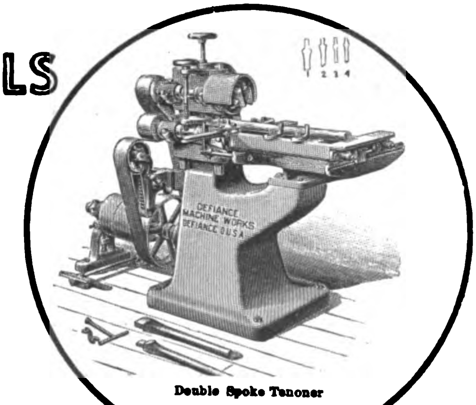
THE .... DEFIANCE MACHINE WORKS · DEFIANCE, OHIO.



12" Rim Bender


DEFIANCE MACHINE WORKS DEFIANCE, O. U.S.A.

Automatic Spoke Facer


2 1 4
DEFIANCE MACHINE WORKS DEFIANCE O. U.S.A.

Double Spoke Tenoner

S. & M. Simplex

The American Automobile that combines the merits of the Panhard and Mercedes Cars

Proved - by - Experience

RELIABILITY

Ease of Control

Speed with Safety

Noiseless Action—Minimum Vibration

Economy of Maintenance

Mechanism always Accessible

Superior Hill-climbing Ability

The All-the-year Car for All Roads

PANHARD

MERCEDES **RENAULT**

S. & M. SIMPLEX

Smith & Mabley

(INCORPORATED)

Broadway, 56th, 57th Sts., New York

Members Association Licensed Automobile Manufacturers
Licensed Importers under Selden Patent 549160

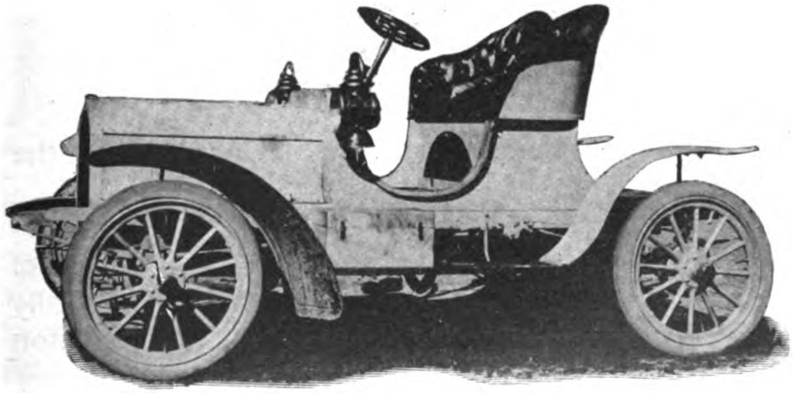
Here It Is

THE NEW
PAGE RUNABOUT

$750.00

More real automobile for the money than anything yet produced. This is a strong statement but we have got the goods to back it. See it at the Boston show and judge for yourself.

AIR COOLED



SHAFT DRIVE

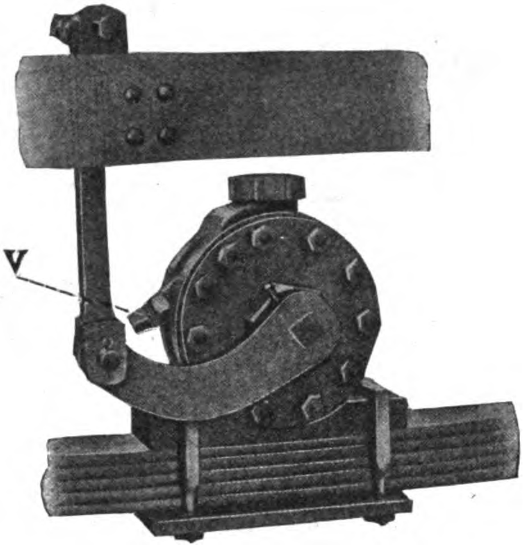
We have too many distinctive features to innumerate in this space. The most of our output is already sold locally but we desire to start a few live agents who want a good thing now and the best seller on the market for the 1907 season. Write for catalogue.

The Page Motor Vehicle Company
Providence, R. I.

The
Hotchkin Anti-Jolt Device

(Shock Eliminator)

This illustration shows view looking along axle toward wheel from inside of machine



Patents pending in United States and Foreign Countries.

Is the only eliminator made that really *eliminates* the shock.

¶ It is a hydraulic device, and works in one direction only—on the recoil. The natural compression of the springs is not checked, but the recoil IS effectually checked, thus making the tonneau a place of comfort instead of a torture-chamber.

¶ *It prevents jolting, broken springs* and *injury* to the *spines* of the *passengers.* By reducing the vibrations, it secures better traction, higher speed, greater life of tires and stronger nerves and better temper for the motorist.

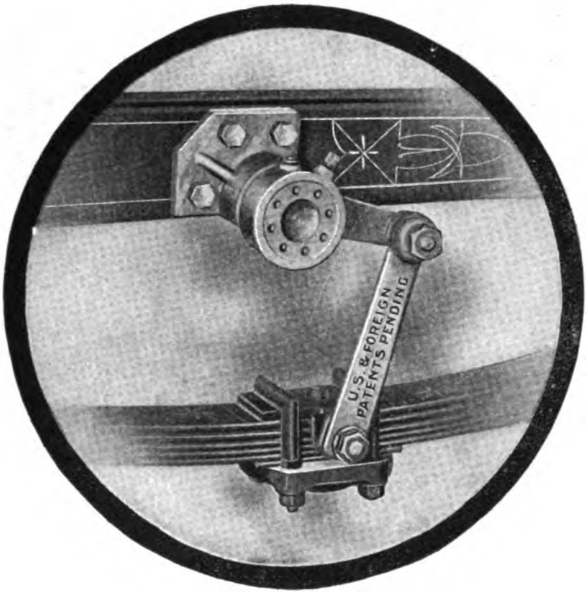
¶ This device is *readily adjustable* to all classes of vehicles at the valve V. *When adjusted it stays adjusted.*

FOR FULL INFORMATION, PRICES, ETC., ADDRESS

P. M. Hotchkin

4022 Lake Avenue **Chicago, Illinois**

DIEZEMANN



The **Diezemann Shock Absorber Company** is prepared to protect all dealers and users of their shock absorber. Should a competitive shock absorber manufacturer enter suit against any concern or individual, for using the **Diezemann** device, the case will be defended by this company's attorneys and the costs, if any, paid by this company. Remember these facts; you can not copyright a descriptive term nor can you patent a principle. We are the leading manufacturers of Shock Absorbers—and our product is without question, the one practical device on the market to-day.

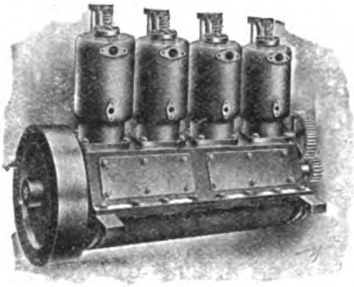
"Ride Rough Roads Right"

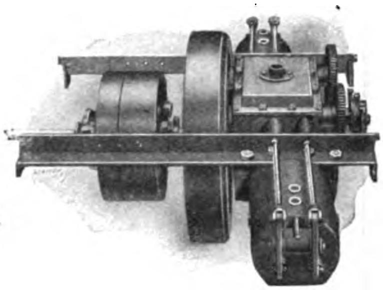
Diezemann Shock Absorber Company
1317 Hudson St., Hoboken, N. J.

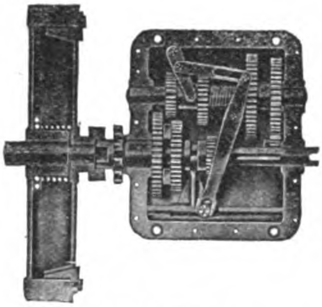
Model Engines, Transmissions and Finished Cars

ENGINES

Double opposed engines, 12 to 24 H. P. Air cooled 4 cylinder vertical engines 20 H. P. Water cooled 4 cylinder vertical 25 to 60 H. P.



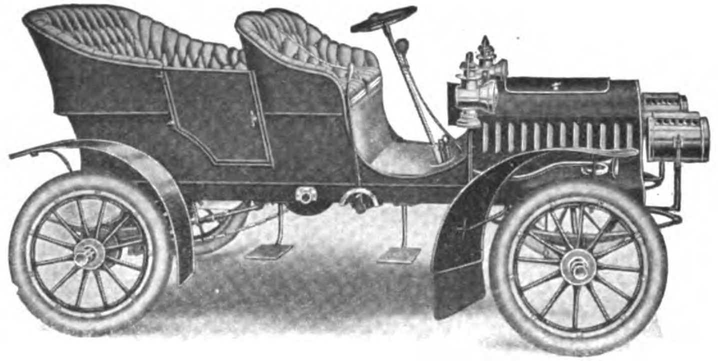




TRANSMISSIONS

Sliding gear 3 forward speeds and reverse either chain or shaft drive.

Planetary 2 forward speeds and reverse also 3 forward speeds and reverse.



CARS

We build four standard cars and guarantee them to have sufficient power to take from 20 to 25 per cent. grades on high speed when geared to 40 miles per hour.

SPECIAL CARS AND TRUCKS

We build special cars and trucks ranging in price from $1,000 to $10,000.

STATIONARY AND MARINE ENGINES

We build a line of single cylinder stationary engines from 2 to 100 H. P. 4 cylinder stationary and marine engines from 15 to 500 H. P.

In writing for catalogue be sure and state size and style on which you are figuring.

Model Gas Engine Works

Lock Box, 2027 AUBURN, INDIANA.

Eastern and Foreign Office: B-21, Produce Exchange, New York City.

Wayne

We make a car for every requirement at a price to suit every purchaser.

Simplicity is the key note of Wayne design and in all our cars, the one aim has been to get *all* the engine power to the wheels without waste.

Which of these six models interests you?

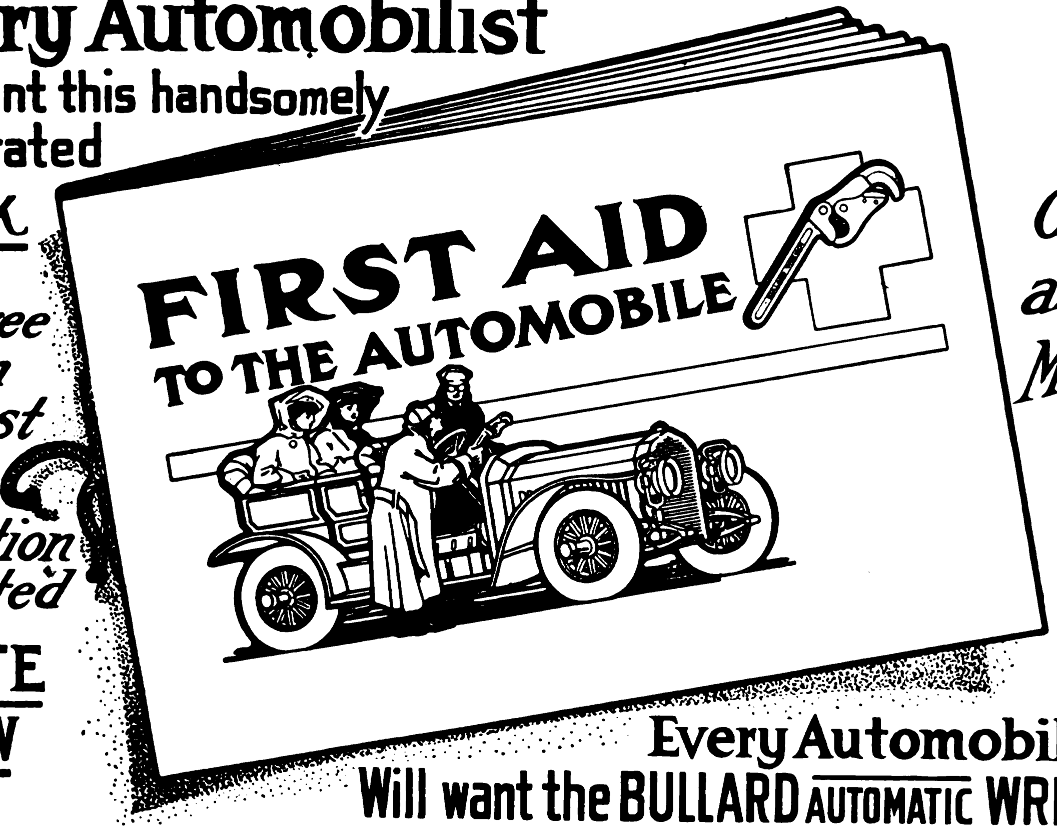
Model F.	Seven passenger touring car, 4 cylinder 50 h. p. motor (Limousine $4500.00.)	$3500.00
Model K.	Five passenger touring car, 4 cylinder 35 h. p. motor	2500.00
Model B.	Five passenger touring car, 4 cylinder 24-28 h. p. motor	2000.00
Model C.	Five passenger family car, 2 cylinder opposed 20 h. p.	1250.00
Model G.	Five passenger family car, 2 cylinder opposed 14 h. p. engine under hood	1000.00
Model H.	The business man's two passenger runabout. Same engine as Model G.	800.00

Let us send you catalog and full particulars about any of these cars.

Wayne Automobile Co.

Dept 9. **Detroit, Michigan**

Every Automobilist
will want this handsomely
illustrated
Book



Sent Free
Upon
Request

The Edition
Is Limited

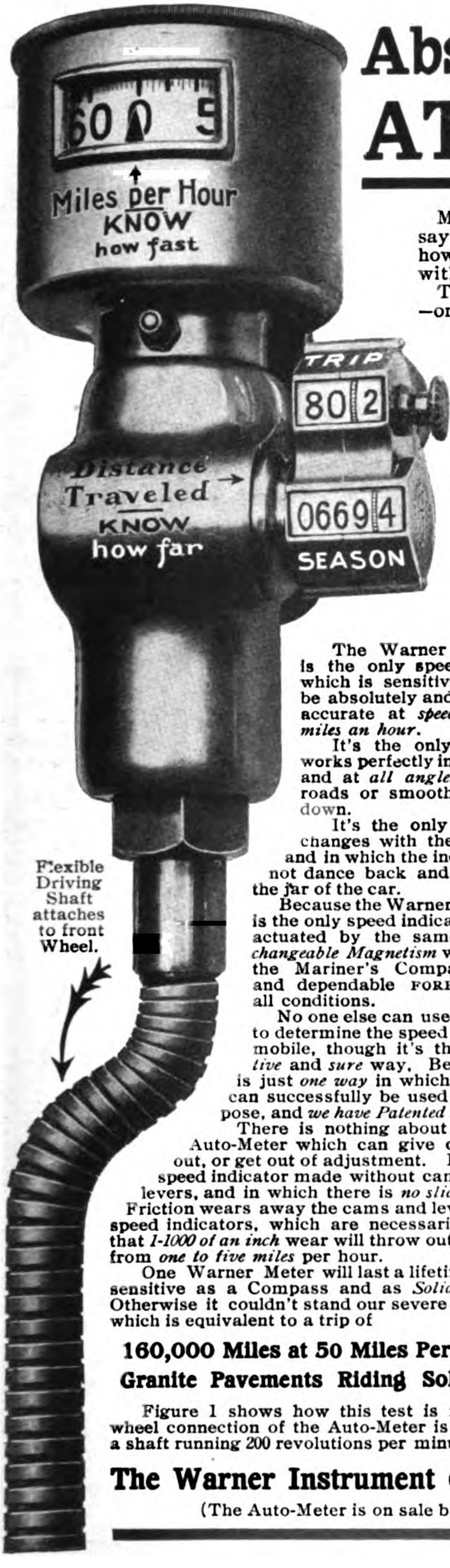
WRITE
NOW
TO

Out
about
March
1.

Every Automobilist
Will want the BULLARD AUTOMATIC WRENCH

THE BULLARD AUTOMATIC WRENCH CO.,
PROVIDENCE (INCORPORATED) RHODE ISLAND

Absolutely Accurate AT ALL SPEEDS



Flexible Driving Shaft attaches to front Wheel.

Mr. Motorist, there's a world of satisfaction (to say nothing of safety) in knowing FOR SURE just how *fast* you are going and how *far* you have gone, without the slightest Doubt or Guesswork about it.

There is just one way to KNOW this absolutely —only *one*—and that's to equip your car with

The Warner Auto-Meter

(Registers Speed and Distance)

This little instrument always *tells the truth.* It registers with ABSOLUTE ACCURACY from ¼ *mile* to 60 miles per hour, It attaches to any Automobile made.

The Warner Auto-Meter is the only speed indicator which is sensitive enough to be absolutely and unfailingly accurate at *speeds under 10 miles an hour.*

It's the only one which works perfectly in *all positions* and at *all angles*, on rough roads or smooth, up hill or down.

It's the only one which changes with the *speed alone* and in which the indicator does not dance back and forth from the jar of the car.

Because the Warner Auto-Meter is the only speed indicator which is actuated by the same *fixed, unchangeable Magnetism* which makes the Mariner's Compass reliable and dependable FOREVER under all conditions.

No one else can use Magnetism to determine the speed of an Automobile, though it's the only *positive* and *sure* way. Because there is just *one way* in which Magnetism can successfully be used for this purpose, and *we have Patented that way*.

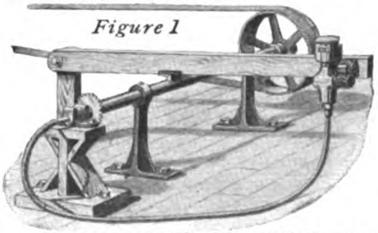
There is nothing about the Warner Auto-Meter which can give out, or wear out, or get out of adjustment. It is the only speed indicator made without cams, plates or levers, and in which there is *no sliding friction.* Friction wears away the cams and levers in other speed indicators, which are necessarily so small that *1-1000 of an inch* wear will throw out the reading from *one to five miles* per hour.

One Warner Meter will last a lifetime. It is as sensitive as a Compass and as *Solid as a Rock.* Otherwise it couldn't stand our severe service test, which is equivalent to a trip of

160,000 Miles at 50 Miles Per Hour on Granite Pavements Riding Solid Tires.

Figure 1 shows how this test is made. The wheel connection of the Auto-Meter is attached to a shaft running 200 revolutions per minute. Across this shaft lies a plank of hard wood, which is hinged at one end and has the Auto-Meter attached to the other. Brazed to the shaft is a knob of steel, which at every revolution "bumps" the plank, giving to the Auto-Meter 200 shocks per minute while it is showing a speed of 50 miles an hour. Each one of these shocks is more severe than would be suffered in an entire season's riding. After running 10 hours a day for THREE MONTHS, actual tests show the Auto-Meter to be recording the speed with the same accuracy as at first within 1-1000 of 1 per cent or less than 6 inches per mile. NO OTHER SPEED INDICATOR ON EARTH COULD STAND THIS TEST.

Figure 1



This is why we sell each Auto-Meter on a

10 Years Guarantee

and why we gladly renew any Auto-Meter (which has not been injured by accident) in which the Magnet (the Heart of the instrument) is less accurate than 1-10 of 1 per cent after 10 years use.

The cost of an Auto-Meter is nothing to a man who can afford $1000 for an Automobile. It adds a feeling of absolute certainty and perfect security worth many times the price.

We will gladly tell you more about this wonderful instrument if you will write us, and at the same time will send you something every motorist will prize—our

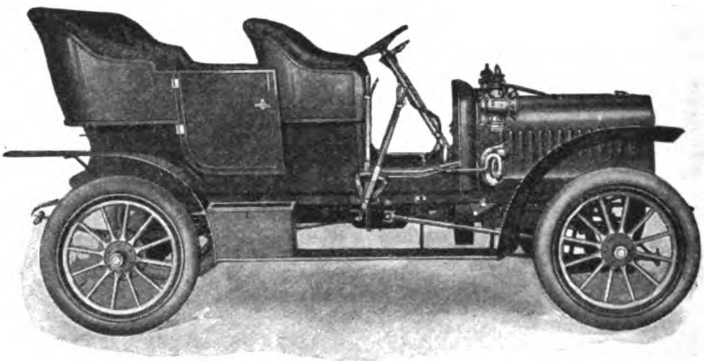
FREE BOOK—"AUTO POINTERS."

Don't GUESS yourself into trouble. If you are interested in KNOWING you are right when you go ahead, the Warner Auto-Meter will tell you *truly* year in and year out. Write for particulars TODAY—don't put it off.

The Warner Instrument Co., 158 Roosevelt St., Beloit, Wis.

(The Auto-Meter is on sale by all first-class dealers and at most Garages.)

MOLINE



Three Models

Model "C"

Light Touring Car
18-20 H. P., $1750.00

Model "A"

Touring Car
30-35 H. P., $2500.00

Model "G"

Touring Runabout
16 H. P., $1000.00

The **Moline** line of automobiles is winning widespread popularity. Every essential feature of the best automobiles on the American market is to be found in **Moline** cars, at prices which are not prohibitive. They will give the longest service with the least trouble. As an investment for the individual or a selling proposition for the dealer, they are unexcelled.

Write for detailed descriptions.

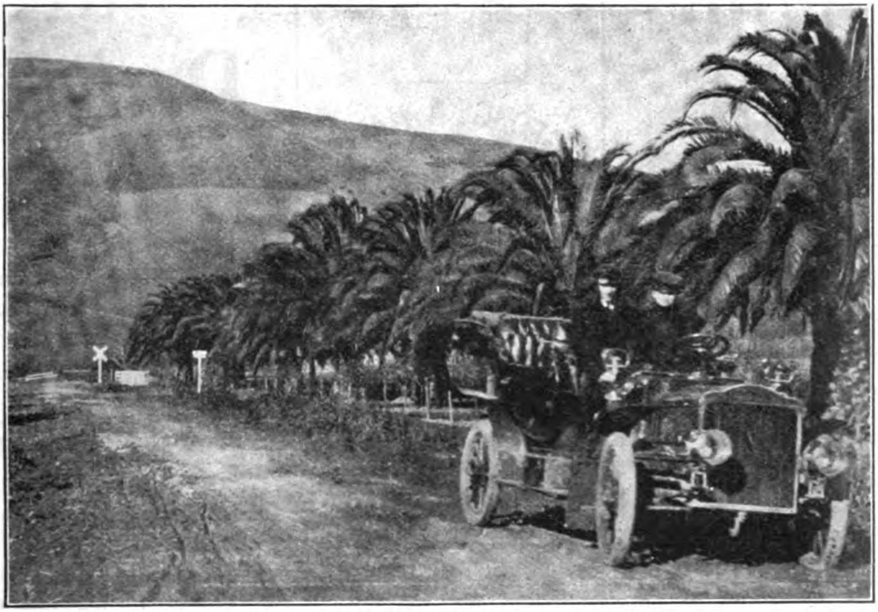
Moline Automobile Company, East Moline, Ills., U.S.A.

New York—Automobile Exchange & Storage Co., 183-89 West 38th Street
Boston—C. H. Saunders "Motor Mart"
Cleveland—Hipp, Reitz & Hall Automobile Company, 251-255 Viaduct
Minneapolis—Walter G. Benz, 316-322 Fourth Ave., South
Los Angeles—Wm. Gregory, 602-609 North Main St.
Milwaukee—M. E. Wait
St. Louis, Mo.—Union Auto Co.

The Incomparable

WHITE

The Car for Service



THE WHITE STEAMER ABROAD

The favorable comparisons frequently made between various American machines and the best known of the foreign makes are interesting, but we believe that a specific statement of the sales abroad of these machines would be more convincing.

This company has a branch office in London, (exclusively for its automobiles), which was established in 1901. We also have flourishing agencies in Paris, in Antwerp and in Milan. Our Cars are thus sold in four European countries in competition with the home product. The price abroad is the American price plus all extra charges for freight, duty, etc. The number of White cars already contracted for to be delivered in Europe this season reaches well into three figures.

This extensive European organization insures that White tourists will receive abroad every courtesy and attention.

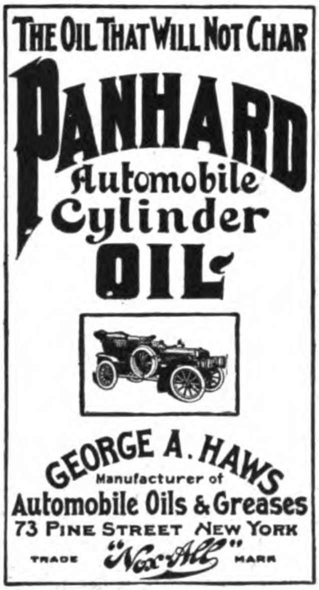
In addition to our European business, we have agencies in Japan, in Australia, in the Philippines, in Hawaii and in Mexico. As an example of the importance of these agencies, we might call attention to the fact that there are more Whites in progressive Japan than all other makes combined.

Write for Literature

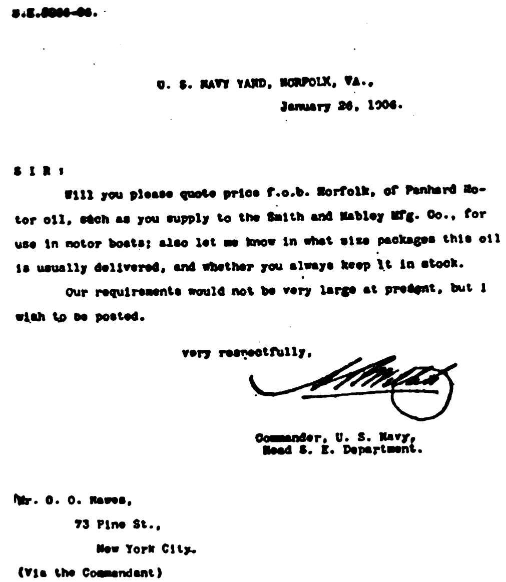
WHITE SEWING MACHINE COMPANY

Cleveland, O.

The Oil That Will Not Char


THE OIL THAT WILL NOT CHAR
PANHARD
Automobile
Cylinder
OIL
GEORGE A. HAWS
Manufacturer of
Automobile Oils & Greases
73 PINE STREET NEW YORK
TRADE "Nox-All" MARK

And WE Can Prove It



S.E.[illegible]-06.

U. S. NAVY YARD, NORFOLK, VA.,
January 26, 1906.

SIR:

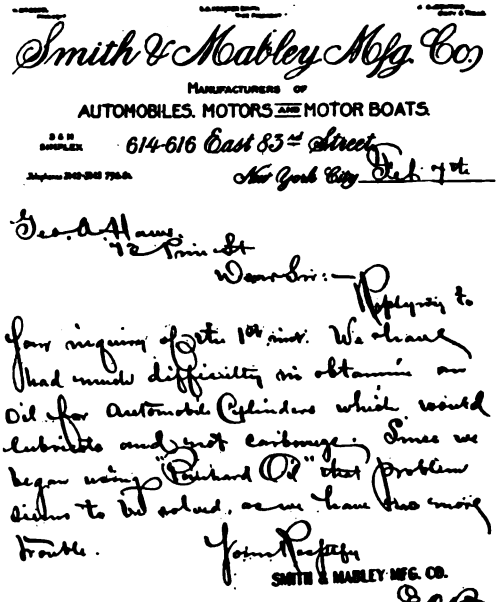
Will you please quote price f.o.b. Norfolk, of Panhard Motor oil, such as you supply to the Smith and Mabley Mfg. Co., for use in motor boats; also let me know in what size packages this oil is usually delivered, and whether you always keep it in stock.

Our requirements would not be very large at present, but I wish to be posted.

Very respectfully,

Commander, U. S. Navy,
Head S. E. Department.

Mr. G. O. Hawes,
73 Pine St.,
New York City.
(Via the Commandant)



Smith & Mabley Mfg. Co.
MANUFACTURERS OF
AUTOMOBILES. MOTORS AND MOTOR BOATS.
S & M SIMPLEX 614-616 East 83rd Street
New York City Feb. 7th

Geo. A. Haws,
72 Pine St
Dear Sir:— Replying to your inquiry of the 1st inst. We have had much difficulty in obtaining an Oil for Automobile Cylinders which would lubricate and not carbonize. Since we began using "Panhard Oil" that problem seems to be solved, as we have no more trouble.

John [illegible]
SMITH & MABLEY MFG. CO.
E.C.B.

The above letters ought to convince anyone that Panhard Oil has superior advantages. If your dealer does not handle Panhard Oil write us.

GEO. A. HAWS MANUFACTURER OF AUTO OIL AND GREASES
73 PINE ST., NEW YORK

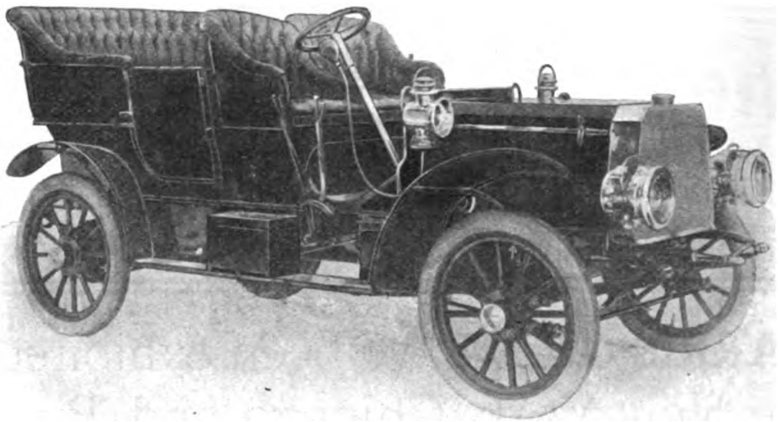
FOR AUTOMOBILE
HARRIS OIL
LUBRICATION

HARRIS OILS have been exhibited at the New York, Chicago and Boston Shows, and interested owners of cars from all parts of the country will inquire for Harris Oils and Lubricants this season.

We have placed the full line in many of the large cities but are unable to call on all the important garages that should also have Harris Oils, and suggest an inquiry by mail, full particulars regarding grades, prices, etc. New catalogue.

A. W. HARRIS OIL CO. 333 S. WATER ST.
PROVIDENCE, R. I.

GROUT



$2500.

ESTABLISHED
1896

SEEN BUT NOT HEARD

Mr. Thomas A. Edison owns a GROUT

Gasoline Car

30-35
H. P.

THE CAR OF
QUALITY
&
SIMPLICITY

Mr. Thomas A. Edison visited the Grout factory and made a thorough investigation in regard to Grout construction.

Mr. Edison was then given a demonstration over all kinds of hills and roads of western Massachusetts.

Mr. Edison then placed his order for a Grout 1906 Gasoline car, which he has run for three months.

This sale should appeal to every buyer of a good automobile.

GROUT BROS. AUTOMOBILE CO.,

ORANGE, MASS., U. S. A.

Agencies:

MUNSING & CHAPMAN
1855 Broadway, New York

A. T. WILSON
1558 Broadway, Denver, Col.

L. D. TAYLOR
Brattleboro, Vt.

20th CENTURY MOTOR CAR CO.
1421 Michigan Avenue, Chicago, Ill.

WHITNEY & CONVERSE
Winchendon, Mass.

GROUT BROS. AUTOMOBILE CO.
H. W. LANSING, Manager
311 Third St., S., Minneapolis, Minn.

J. A. PETREE
New Haven, Conn.

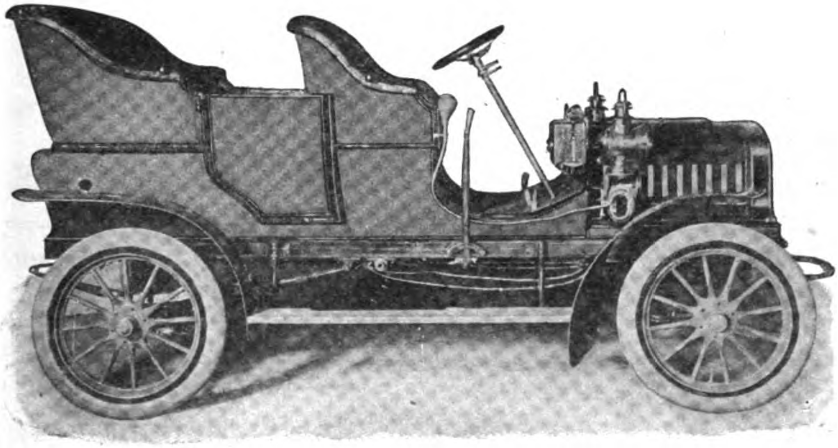
P. H. JOHNSON CO.
287 Halsey St., Newark, N. J.

H. K. DODGE
Glen Cove, N. Y.

The CURTIS, HAWKINS CO.
Motor Mart, Park Sq.,
Boston, Mass.

Catalogue sent to any address in World on application.

AUBURN



1906 Model C

This car has a 5 x 5 double opposed motor and will do any stunt that any other car will do with the same size motor. We do not care what make the other car is, **we make no exception.**

Our car runs and runs all the time. We have as little trouble as any other concern in the business. Now what more do you ask. We have the goods at the right price and we are giving you more for the money than any other concern in the business. These are facts and not hot air.

Write us for agency.

Auburn Automobile Co.

Auburn, Ind.

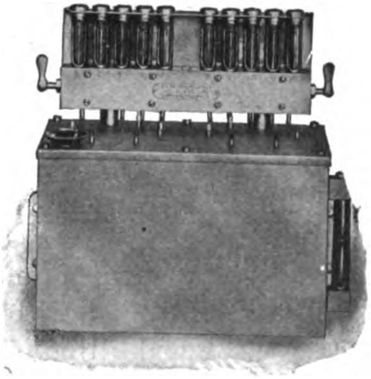
ROLL *of* HONOR

THE FOLLOWING NAMED CARS WILL HAVE

Hill Precision Oilers

AS A PART OF THEIR STANDARD EQUIPMENT FOR 1906

Acme
Aerocar
Austin
Cleveland
Crawford
Chadwick
Elmore
Frayer-Miller
Gale
Jackson
Mahoning
Moline



Waltham
Welch
Winton
Woods
York

Moon
National
Olds
Pierce-Racine
Pope-Toledo
Pope-Tribune
Premier
Rainier
Reliance
Studebaker
Thomas
Tincher

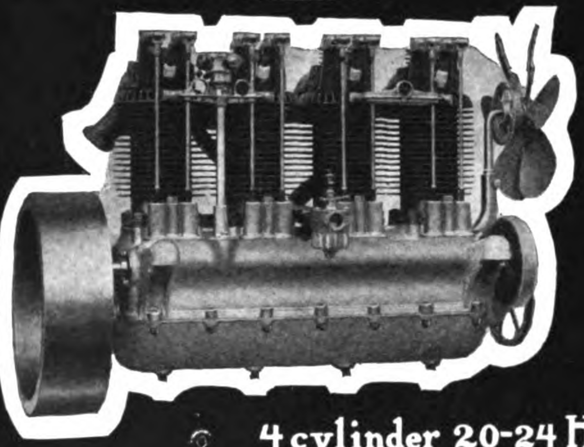
Manufactured by

The Steel Ball Company

832-840 Austin Avenue CHICAGO, U. S. A.

—works 365 days a year.

The Carrico AIR COOLED ENGINE



4 cylinder 20-24 H.P.

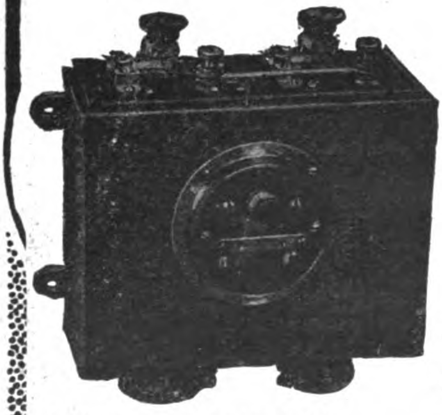
Makes automobiling an absolute pleasure—always.

Investigate—our Catalog explains — get it now.

Our "Universal" Carburetor is also a "top-notcher."

SPEED CHANGING PULLEY CO
754 WASHINGTON ST. INDIANAPOLIS, IND.

SPLIT



Splitdorf

ESTABLIS

The Home of "Am

Coils, High Tension
Tension Magnetos,
Bearing Commuta
and Low Te

REMEMBER 70 per cent. of
equipped with

C. F. SPLITDORF,

DORF

Laboratory

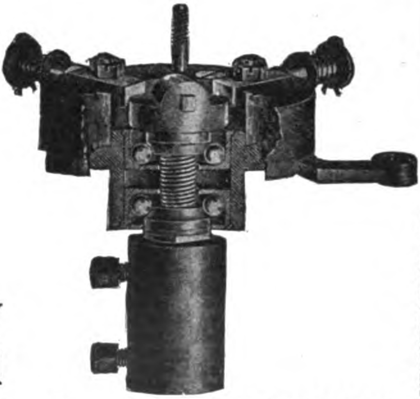
HED 1858

erica's Standard"

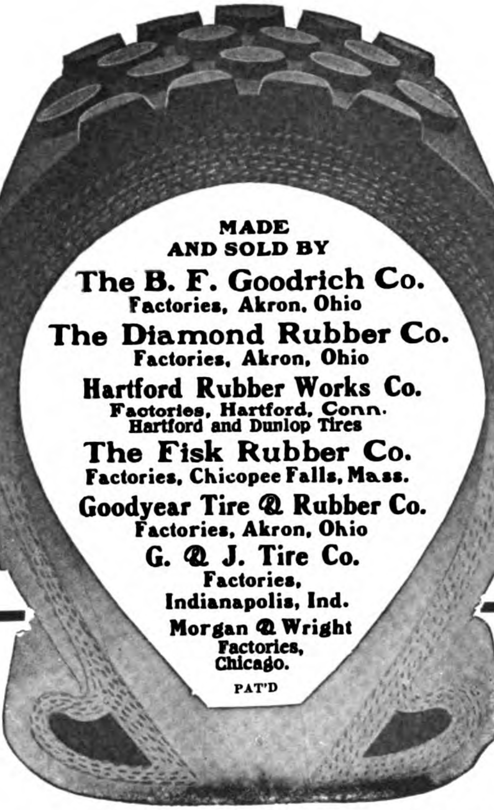
Magnetos, Low
Spark Plugs, Ball
tors, Switches, High
nsion Cable.

the cars at the New York Shows were
"Splitdorf" Product.

17-27 Vandewater St., N. Y



N. B.—The extra cost of Bailey Tires on the LIST more than smooth of same make, is 2½ and 3 inch, $1.50 each; 3½ inch, $2.00 each; 4 inch, $2.50 each; 4½ inch, $3.00 each; 5 inch, $3.75 each.



MADE
AND SOLD BY
The B. F. Goodrich Co.
Factories, Akron, Ohio
The Diamond Rubber Co.
Factories, Akron, Ohio
Hartford Rubber Works Co.
Factories, Hartford, Conn.
Hartford and Dunlop Tires
The Fisk Rubber Co.
Factories, Chicopee Falls, Mass.
Goodyear Tire & Rubber Co.
Factories, Akron, Ohio
G. & J. Tire Co.
Factories,
Indianapolis, Ind.
Morgan & Wright
Factories,
Chicago.
PAT'D

N. B.—Now ready: Bailey's "Won't Slip" tread BANDS for covering all makes and sizes of smooth, new or partly worn tires at nominal cost by Bailey tire manufacturers. Write for prices.

Non Skid Rubber Tread

Gives Perfect Traction

Bailey's "Wont Slip" Tires Cross Snow Capped Mountains

Mr. J. C. BAILEY, Boston, Mass.,
Dear Sir: After the wonderful work the Reo Mountaineer has been able to perform in its double transcontinental trip, equipped with Bailey "Won't Slip" tires, I think a few lines of thanks to you, the inventor, are in order.

Probably you have forgotten it by this time, but I used one of the first pair of Bailey "Won't Slip" bicycle tires on my racing bicycle for indoor track work in 1898-99. They gave such excellent results that when I gave up cycling for automobiling I still remained a firm believer in the Bailey tire construction and I can truthfully say that **without them the lives of my mechanic, Mr. Fassett, and myself would have been in constant jeopardy while crossing the snow capped mountains over an uncertain trail.**

Very truly yours,
PERCY F. MEGARGEL,
Driving the Reo Mountaineer.

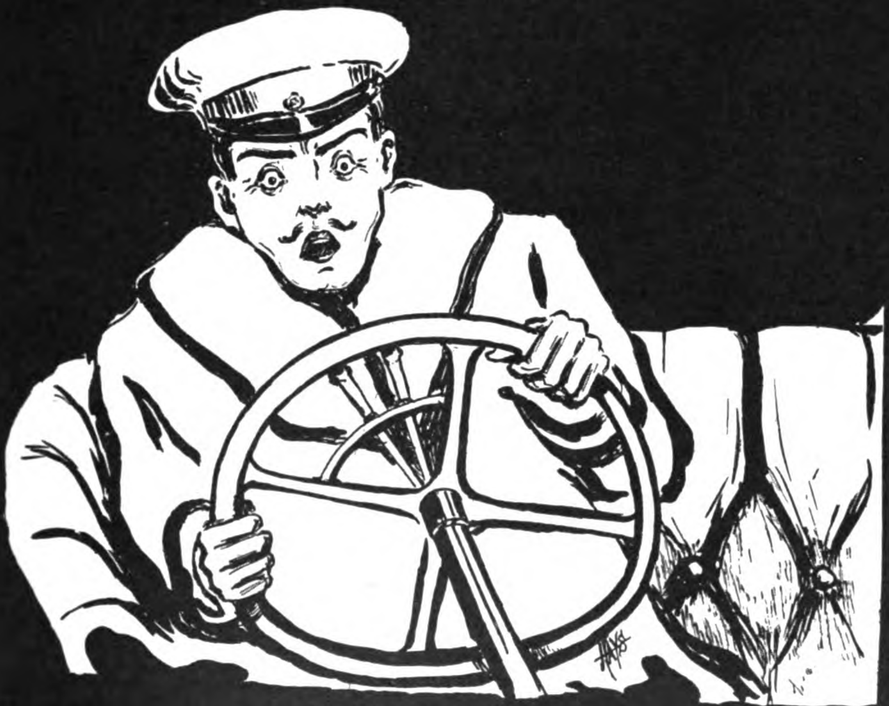
GALLUP, NEW MEXICO,
February 10, 1906.

Economy and hill climbing contests, and practical every-day use have demonstrated that this tire is the best equipment for any type of automobile, because of the superiority of the BAILEY "Won't Slip" tread. They have received the highest endorsement that can be given, viz:—that the largest and most reliable tire manufacturers in America are making and selling BAILEY "Won't Slip" TIRES. They are to the automobile as the rudder is to the ship. They prevent skidding, give perfect traction on all kinds of surfaces, and add to the life of the tire. Order them on your new car. Dealers and repairmen everywhere supply them. Accept no others. Write for prices and booklet.

C. J. BAILEY & CO., Patentees

22 Boylston Street
Boston, Mass., U. S. A.

THE HEALY LEATHER TIRE



SKIDDING!

SAVE YOURSELF FROM THIS DANGER

THE HEALY TIRE
POSITIVELY PREVENTS SKIDDING

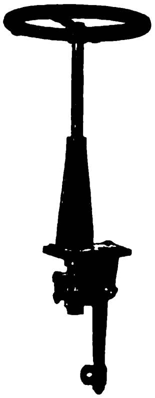
HEALY LEATHER TIRE CO.

HEALY BUILDING
88-90 GOLD STREET, NEW YORK

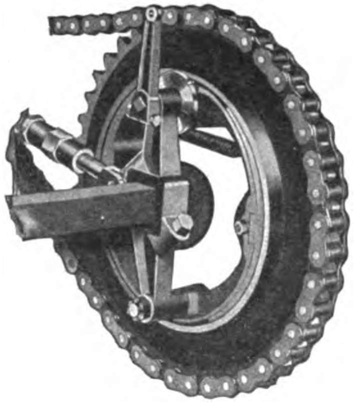
PRICE LISTS AND DESCRIPTIVE CIRCULAR SENT ON APPLICATION

Garford Parts

A few Garford parts in a high grade car enhance its value. Liberal use of them maintain it. Just now we have none for sale. High grade car makers snapped up all we can make this season, just as soon as they were offered—a plain tribute to the excellency of their design and material. Our productive capacity for 1907 will be enlarged so as to avoid the disappointment of fruitless inquiry.



Steering Gear—pinion and sector type also supplied



Brake—made in 3 sizes

Motor Wagon Parts

We can, however, promptly execute orders for steering gears, brakes, sprockets, motor hangers and other parts for motor wagons. They are suitable for all classes of commercial power vehicles, from the lightest to the heaviest. They are not "freak" components of a wonder working vehicle. They enjoy the rare distinction of having been thoroughly tested for some years past in the most varied and severe kind of commercial service.

Circulars 2, 3, 5, 10 and 11 give information concerning them.

THE GARFORD COMPANY, Elyria, Ohio

Sales Manager, HAYDEN EAMES, Cleveland, O.

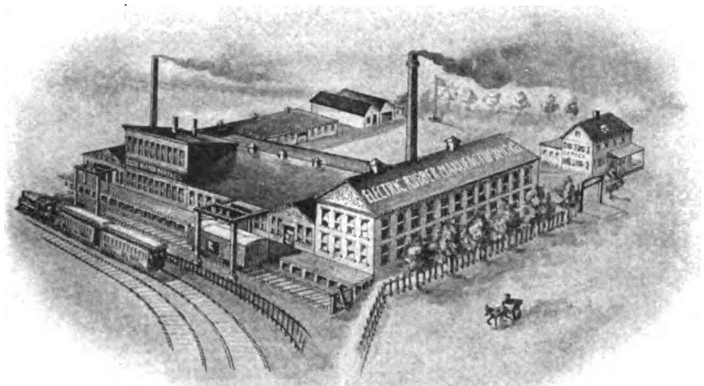
TRADE MARK
PANTHER
CLINCHER TIRES

Electric

THE LARGEST INDEPENDENT

TRADE MARK
PANTHER
CLINCHER TIRES

TIRE PLANT in this COUNTRY



MAIN OFFICE & FACTORY
RUTHERFORD, N. J.

"PANTHER"

Heater-Cured Wrapped Tire

"PANTHER" Covered Tubes Guaranteed not to Pinch, Blow Out, or Tear. More pure rubber, stronger and more durable than any tire made.

ALL SIZES

We have an Interesting Proposition to Manufacturers of Complete Cars. Write us.

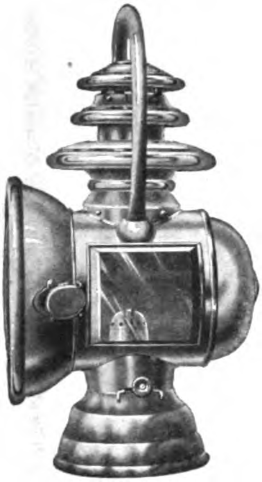
TRADE MARK
PANTHER
CLINCHER TIRES

Electric
Rubber Mfg. Co.
Rutherford, N. J.

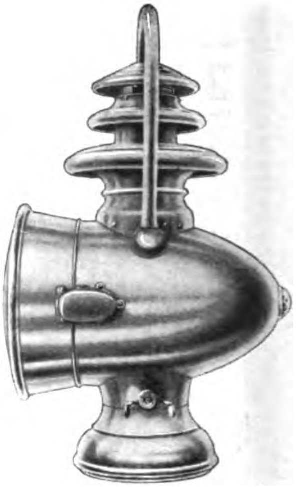
TRADE MARK
PANTHER
CLINCHER TIRES

GRAY AND DAVIS

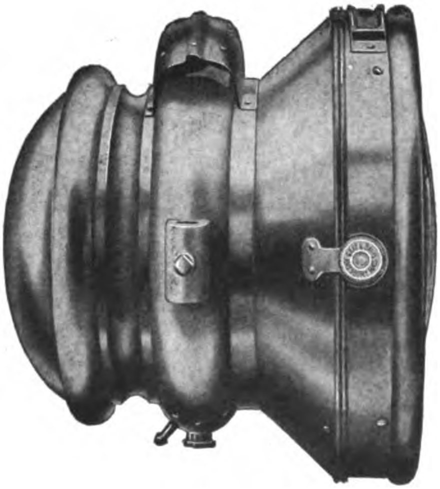
LATEST HIGH-GRADE DESIGNS



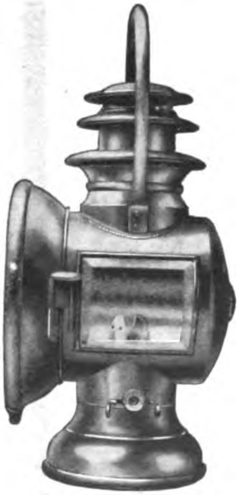
No. 29. Large, Massive Oil Side Lamp for Large Touring Cars.



No. 26. Large Oil Side Lamp for Large Touring Cars.



No. 50. Headlight for Medium Size Touring Cars.
No. 55, Headlight for Large Size Touring Cars.
No. 56. Headlight for Extra Size Touring Cars.



No. 19. Oil Side Lamp for Medium Size Touring Cars.

No. 17. Tubular Oil Tail Lamp for Large Touring Cars.

GRAY & DAVIS, Amesbury, Mass., U. S. A.

Facts worth considering

The same liberal treatment that built up our tire business will be noticed in our automobile supply department. We handle only such accessories as will be satisfactory to purchasers.

Our stock is brand new, consequently, strictly up-to-date. We handle the best of everything, whether American or foreign.

WE
AWAIT
YOUR
ORDERS

Tires — GIBNEY — Supplies

We are Special Philadelphia Branch for

Fire-stone Tires

Side wire solid, mechanically fastened pneumatic and cushion

IMPORTED
Continental Tires

THE WORLD'S BEST
The "Gibney" Special

Bicycle Tire is one of our leaders. It is a thoroughly good, reliable and long-wearing equipment for your wheel. Write for prices and further particulars.

Jas. L. Gibney & Bro.

211-213 N. Broad St., Philadelphia, Pa.

Everything for Automobile DEALERS AND OWNERS

We are Manufacturers' Agents and Distributors, Manufacturers, Importers, Jobbers and Wholesalers of

Automobile Supplies, Materials Accessories, and Tools

Western Distributors of **CONTINENTAL TIRES** Best by Every Test

We Give Your Orders

Careful and Accurate Shipment

Prices that are Right

Prompt and Courteous Attention

Excelsior Supply Co.

Send for Catalogue "AA"

Established 1876 **CHICAGO, ILL.**

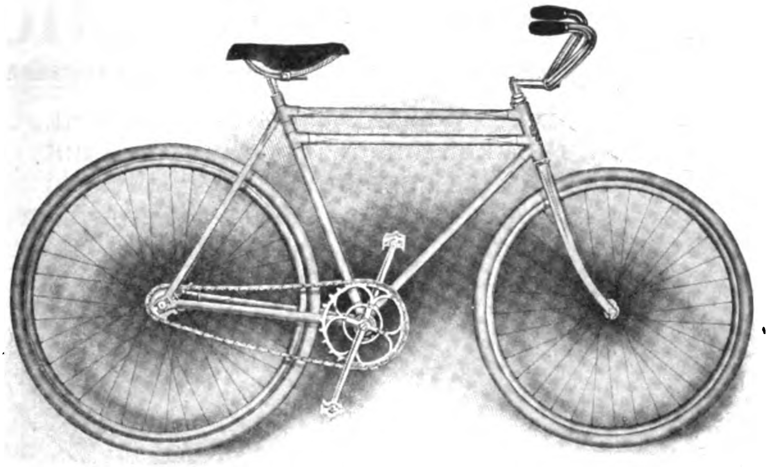
233-235-237 RANDOLPH ST.

Excelsior Bicycles

"Hand Made, Best Made"

TWIN

TRUSS



"TWIN TRUSS"

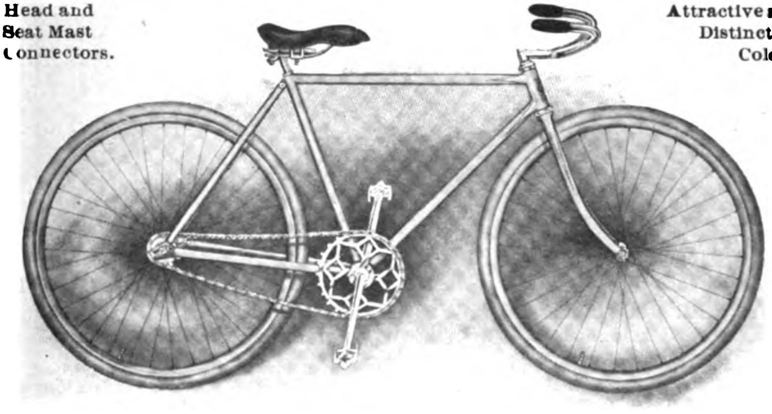
"Twin Truss," the latest original design. Double Top Bar and Double Forged Crown. Construction gives rigidity, durability, beauty and grace.

Handsomely Feathered Head and Seat Mast Connectors.

Enameled in Attractive and Distinctive Colors.

100

100



MODEL NO. 100

A Bicycle of up-to-date construction, superior finish and quality. Pinch Belt Cluster.

Write for Prices and Agencies.

EXCELSIOR SUPPLY CO.

233-5-7 Randolph St., Chicago.

"Trouble-Proof" Tire

Fawkes 1906 Clincher

No Pumping. No Puncturing. No Experiment. Thoroughly Tested on hundreds of Autos **and not a single dissatisfied customer.** Every tire sold is our best salesman, and our business is growing by leaps and bounds.

Milwaukee, Wis., Jan. 2, 1906.

The Milwaukee Rubber
Works Company,
Cudahy, Wis.

Gentlemen:—I have driven the Fawkes Clincher Tires on my Model B Cadillac about 6,000 miles. They are the most satisfactory tires I have ever used.—and I have used many—including———, ———, ———, ——— and ——— Tires. They are resilient and ride quite like a pneumatic tire.

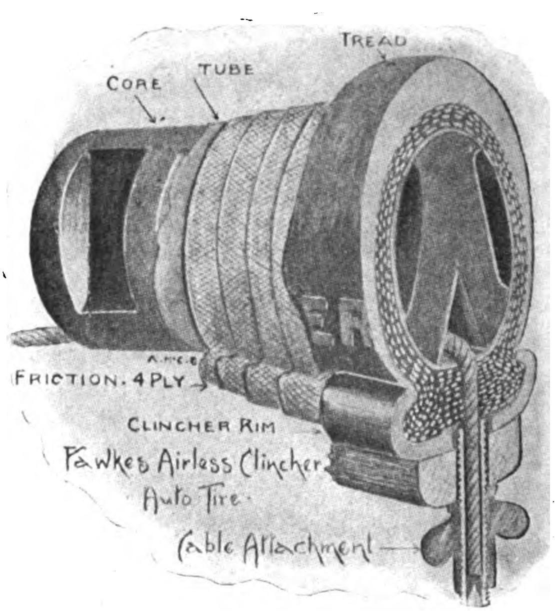
With these tires THERE ARE NO TROUBLES and from the appearance of the tire after 6,000 miles' use I believe they are good for as many more miles, and are the most economical as well as the most comfortable tires on the market. THEY SHOULD NOT BE COMPARED WITH SOLID TIRES, AS THEY ARE IN A CLASS BY THEMSELVES.

Thanking you for calling my attention to a tire that would relieve me of the worries of automobiling, I beg to remain, Yours truly,

(Signed) W. B. HILL, M.D.

NOTE.—Where the ——— are above, there are in the original letter the names of four well-known pneumatic tires and one solid, but for obvious reasons we have omitted the names.

[illegible] WORKS CO.



We can prove the following facts to be absolutely true

1st. The Fawkes New Clincher 1906 Tire is the BEST Automobile Tire that has ever been manufactured.

2nd. The Fawkes New Clincher Tire is neither Solid nor Pneumatic but has the best Qualities of both and none of their Defects. It rides as easy as Pneumatic and lasts longer than any tire on earth.

3rd. The Fawkes New Clincher Tire will fit any standard G & J Clincher rim, can be put on by anyone without experience or special tools in ten minutes, and when once on cannot be torn off.

4th. The Fawkes New Clincher Tire is absolutely Trouble Proof. No Pumping. No Puncturing. Always ready for use. Makes automobiling thoroughly SAFE and enjoyable.

1st, LAST AND ALWAYS. The FAWKES NEW CLINCHER TIRE rides as easy as pneumatic.

Please don't be DECEIVED and take the WORD OF ANYONE to whose interest it is to sell you inferior tires. All we ask is a CHANCE TO TELL OUR SIDE OF THE STORY. A postal card TO-DAY will bring you full particulars. We KNOW we can save you a great deal of TROUBLE and MONEY.

The Milwaukee Rubber Works Co.

CUDAHY, WISCONSIN
(Suburb Milwaukee)

We are Largest Dealers in New, Second-Hand, Demonstrating Automobiles in the World

Send for complete Bargain Sheet of Automobiles on hand. No matter what YOU are looking for, YOU are sure to find it at our place.

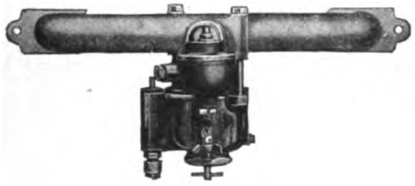
Times Square Automobile Co.

164 W. 46th St., New York City
2 doors East of Broadway.

Holley Carburetors

are the best in the world, because each one is designed and perfected to meet the special requirements of the car it is to be used on.

Here is our **MODEL "A"** Carburetor for Oldsmobile runabouts. Price with all attachments, $12.00. We made exhaustive tests and experiments with this carburetor on the Oldsmobile until we obtained an increase in horse power of 20 per cent. and a large decrease in fuel consumption. We have sold 4,000 in one year and will continue to sell it until every Oldsmobile on earth is equipped with one.



This cut shows our carburetor for 1905 model Wintons B and C. Price, complete, $18.00. It was designed, made and perfected for these cars ONLY. It would not give satisfaction on an Oldsmobile runabout, but it increases the horse power of the above model Wintons and our customers praise it very highly.

Here is is another carburetor for four cylinder work, designed, manufactured and perfected for the 1905 four-cylinder Autocar, Type XI Price, complete, $14.00.

MODEL "A" Special Carburetor for Oldsmobile Touring Runabout ("N" Car) and Oldsmobile Single Cylinder Tonneau ("T" Car) fits in place of carburetor at present on cars, no alterations or special fittings necessary. Price. $11.50.

MODEL "A" Special Carburetor for 1901, '02 and '03 Oldsmobile Runabouts. With each carburetor we furnish a rod, peddle, air screen and spring. 4,000 of these sold during 1905. Price, $12.00. Will increase the horse power of any Oldsmobile 20 per cent. and decrease fuel consumption.

MODEL "A" Special Carburetor for all models of Northern runabout, same as Oldsmobile, with exception of flange. No attachments or fittings necessary. Price, $12.00.

HOLLEY BROS. CO.

668 BEAUBIEN ST.
DETROIT, MICH.

REMEMBER THIS

When you buy a HOLLEY CARBURETOR you get a device manufactured for a special purpose, not a make-shift with a flange screwed on here and a lug stuck on there.

MODEL "A" STANDARD Carburetor made with 1″, 1¼″ and 1½″ gasoline outlet (pipe thread). 1″ size is also made with a special thread for attaching to 1905 model "C" 10 H. P., double opposed Ford Runabout. We also supply this carburetor with gasoline outlet on opposite side from that shown in cut, with flange connection, holes not drilled. The air inlet of the flange carburetor is a female thread; in each instance being ¼″ larger than the gasoline outlet.

Prices, 1″, $11.50; 1¼″, $11.50; 1½″, $11.50.

MODEL "E" Special Carburetor for Franklin Four Cylinder Air Cooled Runabouts 10 H. P., made previous to 1905, no fittings necessary, with the exception of gasoline outlet pipe, as shown in cut.

Price, $12.00.

MODEL "E" Special Carburetor for 12 H. P., Franklin 1905 model, no fittings necessary, with the exception of gasoline outlet pipe, as shown in cut. Price, $12.00. Also made with ¾″ pipe outlet, for motor cycles.

Price, $11.00.

MODEL "E" Special Carburetor for 1905, **Type X Two** Cylinder Aut**ocar Runabout.** Carburetor as **shown, ready** to attach.

Price, **$14.00.**

Special **2″ Model "B"** Carburetor **for models from** 5″ **to** 6″ **bore. Price,** $17.00. Gas**oline outlet can** be shifted **in three different** positions.

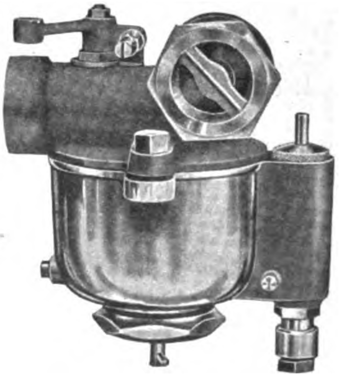
STANDARD MODEL "E" Carburetors furnished as shown, with top or side outlet

For 3½″ bore motor, use ¾″ outlet Carburetor.
Price, $11.00.

For 3½″ to 4″ bore motor, use 1″ outlet Carburetor.
Price, $12.00.

For 4 to 4½″ bore motor, use 1¼″ outlet Carburetor.
Price, $13.00.

For 4½ to 5″ bore motor, use 1½″ outlet Carburetor.
Price, $14.00.



HOLLEY BROS. CO.

668 BEAUBIEN ST.
DETROIT, MICH.

Selling Agents:

NEW ENGLAND, The Post & Lester Co., Hartford, Conn.
PACIFIC COAST AGENTS, The Geo. P. Moore Co., San Francisco and Los Angeles, Cal.
PHILADELPHIA AGENT, W. W. Taxis, No. 506 Odd Fellows' Temple.

For Sale at:

New York—Chas. E. Miller 97-101 Reade St. E. J. Willis Co., 8 Park Place. The Motor Car Equipment Co., 55 Warren St.
Cleveland—Chas. E. Miller, 406 Erie St.
Washington, D. C.—National Electric Supply Co., 1330 New York Avenue, N. W.
Chicago—Excelsior Supply Co., 23 Randolph St. The Automobile Supply Co. 1339 Michigan Ave. The Beekley-Ralston Co., 178 Lake St.
St. Louis, Mo.—J. H. Neustadt, 826 18th St.
Buffalo—J. A. Cramer, 737 Main St. The Kelsey Co., 48 Niagara St.
Detroit—Auto Equipment Co., Jefferson Ave.
Denver—Denver Auto Goods Co., 1534 Glenarm St.
Montreal, Can.—Eastern Automobile Co., 5 Berthelet St. Canada Cycle & Motor Co.
Walkerville, Ont., Can.—G. M. McGregor.

"The Maxwell"

Model H, 16-20 H. P. Touring Car.
Price, $1,450

LAST YEAR

The greatest number of automobiles ever sold by a manufacturer in an initial year.

THIS YEAR

Two new factories and an assured output of 3,500 cars, a large proportion of which are already sold.

WHY?

Because the Maxwell was built on the firm foundation of **experience** and **common sense.** It was **proved** first and sold **afterwards.**

Because it is **capable**: covering ground with capacity, safety and surety.

Because it is **simple**: obviating the necessity of expert attendance.

Because it is **reliable**: with an ability to travel over any kind of road in any kind of weather.

Because it is **durable**: with the power to resist daily wear and tear, that insures long life and usefulness.

Because it is **accessible**: permitting easy inspection and ready adjustment of all primary parts.

Because it is **economical**: with a lowest possible first cost and smallest possible cost for maintenance.

These are FACTS, not promises

Each claim is backed by the actual, everyday records of Maxwell cars that were sold last year and are now in use.

Every buyer of a Maxwell is a Maxwell enthusiast, and **references** are yours for the asking.

Model L, 10 H. P.
Tourabout. Price, $780.

10 H. P. Gentlemen's Speedster.
Price, $800.

"Maxwell" cars are the natural product of the

"Maxwell" Doctrine

It is to the close adherence to this constructive principle or "doctrine" that the designer of the Maxwell credits much of the car's phenomenal success.

THE "DOCTRINE"

1st. A cylinder of 5 inch bore with 5-inch stroke is ideal for a double-opposed gasoline motor.

2d. A double-opposed motor, 5x5 inches, when properly made, develops about 20 actual horsepower.

3d. To use four cylinders for motors of 20 or less horsepower is unnecessary, because thereby the number of wearing parts is unnecessarily increased.

4th. Twenty actual horsepower, not momentum or flywheel horsepower, is enough for every requirement except excessive speed or extreme fashion. Therefore a two-cylinder 5x5-inch, double-opposed motor is the best, and it is as evenly balanced as four-cylinder construction, is very much less complicated, and much more reliable. It would take four 4x4-inch cylinders to develop the same power as two 5x5-inch cylinders, properly made.

5th. Four-cylinder cars appeal largely to 'Fad and Fancy" only; two-cylinder cars produce reliable service.

There is not one experiment in the "Maxwell" make up. Every principle of automobile construction that has been proved BEST is there. Motor up in front. Shaft Drive Multiple Disc Clutch. Large Roomy Steel Body. Pumpless Water Circulation. Three-Point Suspension Motor and Transmission Case in One Unit. Not a THEORY among these features; every one has a practical advantage.

It is the belief of the MAXWELL-BRISCOE MOTOR COMPANY that what the American automobile public wants is not a racing machine, built to go a mile a minute for but a few minutes, nor do they believe that a machine especially equipped by its manufacturers for some important contest should be a basis for a reputation. But they do believe that what is eagerly sought for is an HONEST car, one that will average twenty-five to thirty miles an hour on the road all day long with the lowest attendant cost.

The foregoing is not an implication that we do not believe in races or economy tests. We do believe in them; but the MAXWELL idea is that cars in such races and contests SHALL BE stock cars with standard equipment, and not freak racing machines such as would not be sold to the ordinary purchaser.

All contests in which we have participated have been with stock cars, either standard or stripped to meet the conditions imposed by the contest. In not a single instance has the chassis of a MAXWELL been changed in any respect, either with regard to engine transmission, rear axle, or any other important point. The following gives only a partial list of the victories won by both the Model H and the Model L. The latter, a standard runabout, is yet to be defeated in its class either for weight or cost.

GLIDDEN TOUR. Perfect score, 1,004 miles without a single adjustment, made with Model H. Four first-class certificates.

"CLIMB TO THE CLOUDS," up Mt. Washington. Model H WON the event and the highest honors in its class. Gold Medal.

LONG BRANCH. Model H WON the two-mile free-for-all race for cars costing from $1,000 to $1,700, defeating cars of several times its rated horsepower.

Model L WON the free-for-all handicap race, making a mile in 1 minute 18 seconds.

Model L WON the runabout event for cars costing $1,000 or less.

CAPE MAY RACES. Model H WON the mile race for stock cars of 20 h. p. or less.

POUGHKEEPSIE RACES. Model L DEFEATED THE ENTIRE FIELD, including cars of several times its rated horsepower.

WAVERLY RACES. Model L WON the five-mile handicap against eight cars in the fastest time ever made on the track for that distance, the track two laps to the mile, in 5 minutes 48 seconds.

PHILADELPHIA MOTOR CLUB RACES. Model L WON in the runabout class.

BALTIMORE RACES. Model L WON every race in the meet, defeating cars of double its rated horsepower and several times its cost.

Model L WON a special road race between Baltimore and Washington, a distance of 40 miles, in 1 hour 4 minutes, breaking the record held by a 40 h. p. car by 36 minutes. The time made by the MAXWELL was within four minutes of that made by the Congressional Limited over the Pennsylvania Railroad.

It is noteworthy that after this sterling performance the car was driven back to Baltimore without its engine having been stopped since it left that city.

Besides the 16-20 H. P. Touring Car and the 10 H. P. Tourabout, we have brought out this year a NEW type which we call the "Gentlemen's Speedster," or "The 50 mile an hour car." It is our greyhound, fashioned after Model L, but with a lighter body and greater speed.

It will appeal to the owners of fast, high-priced touring cars as an auxiliary, as sporty as it is speedy.

Our "Doctor Maxwell," a 16-20 H. P. Tourabout with phaeton top, attained great popularity last year among physicians. It may be just the car to suit YOUR requirements.

The Maxwell catalogue gives full specifications of our whole line, which includes, in addition to the above cars, a Limousine Touring car and a particularly practical delivery wagon. We will send this catalogue free to any address, but we would urge prospective purchasers to visit one of the many "Maxwell" agents and see for themselves just what a splendid investment a Maxwell car is.

Write to Department 17 for Catalogue,

MAXWELL-BRISCOE MOTOR CO.,

Members American Motor Car Manufacturers' Association

Factories:

Chicago

TARRYTOWN
Main Plant

Pawtucket

Branches:

Maxwell-Briscoe Co., Inc.,
New York, N. Y.
Maxwell-Briscoe McLeod Co.
Detroit, Mich.

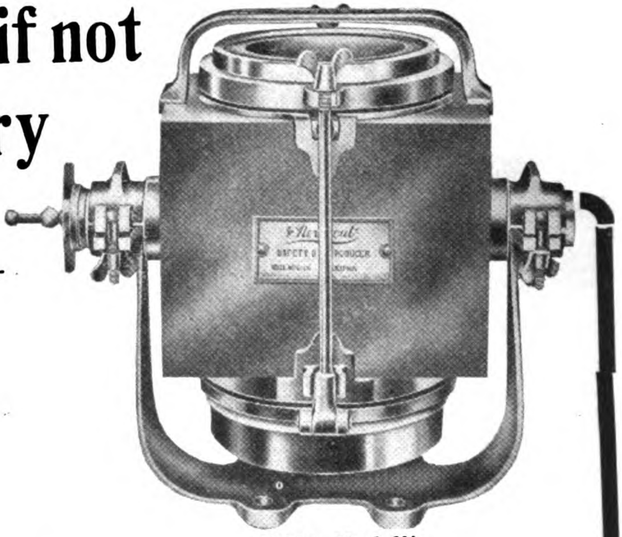
Morrison-Tyler Motor Co.,
Boston, Mass.
Fisher Automobile Co.
Indianapolis, Ind.

Maxwell-Briscoe-Chase Co.,
Chicago, Ill.
Richard Irvin & Co.
Foreign Representatives.

NOTE.—The very latest "Maxwell" product is a 4-cylinder Touring Car of 32-40 H. P. to be sold at $3,000. This automobile is bound to make a sensation with the "motor public," and you owe it to yourself to get the particulars about it. Although not as yet listed in our catalogue, specifications may be obtained from any Maxwell agent.

Money back if not satisfactory

That is the broad guarantee always back of



"1906 Model"

The Neverout

TRADE MARK

Patent Invertible

Safety Gas Producer

for lighting motor cars and boats.

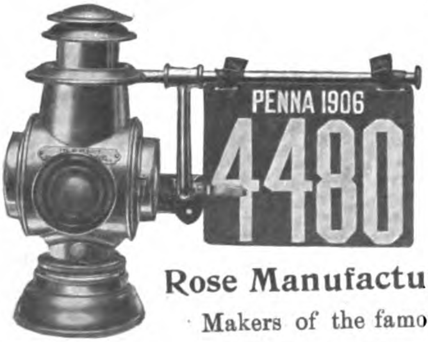
Makes gas only as needed at a cost of less than ½ cent per hour and gives the brightest light ever known. Readymade high pressure gas and ordinary generator gas can't begin to compare with it.

Instantly lighted—no waiting. Instantly extinguished—no after generation or odor.

No risk, no dirt, no trouble

The Neverout Tail Light

A combined lamp and license-holder. Lights license number in compliance with the Pennsylvania State Law, and at the same time throws a bright red light in rear.



Positively stays lit or money back

Write for free booklet.

Rose Manufacturing Co., 911 Arch St., Philadelphia

Makers of the famous *Neverout* Lamps and Searchlights.

CYCLE AND AUTOMOBILE TRADE JOURNAL

Vol. X, No. 10 PHILADELPHIA AND NEW YORK APRIL 1, 1906

March Edition, 24,955

15,808 Copies mailed.
5,300 Copies delivered to News Company.
552 Copies to Phila. and foreign under stamps.
1,950 Distributed at the Philadelphia, Buffalo, Boston and Motor Boat Shows.
1,100 Expressed on special orders.
800 Copies held in reserve.

25,510
565 Back numbers sent out.

24,955 Total copies March edition.
Of these
13,046 were paid subscriptions.
5,300 were news stand sales.

18,346 Total paid.

We print on this page each month an exact statement of the number of copies printed and distributed of the preceding issue of "The Cycle and Automobile Trade Journal."

The bindery count of actual complete copies produced in the March issue was 24,955.

Of these 27,170 pounds were mailed at pound rates, as shown by postoffice receipts. Each copy weighs 27½ ounces, representing 15,808 copies, and 565 copies of unsold back numbers returned by news companies are accounted for, in addition to the total for the month.

We will be pleased to verify the above figures at any time to anyone interested.

A. C. A. Club House Corner Stone Laid

The ceremony of laying the corner-stone of a new club house and garage of the Automobile Club of America on Fifty-fourth street west of Broadway, New York City, was held on Wednesday, March 21, at 4.30 o'clock. This occasion was of much interest to the club, of which a very large number were in attendance as well as many others interested in automobiling; appropriate addresses were made by President D. H. Morris, chairman; Dr. Schuyler Skatts Wheeler, of Building Committee, and ex-President A. R. Shattack.

Coming Events

(For marine coming events, see motor boat department.)

March 31-April 7—Auto Show, Granite Rink, Toronto, Canada.
April 2-7—Baltimore Automobile Show.
April 2-8—Voiturette Competition from Milan to San Remo, Italy.
April 4-7—First Annual Auto Show. Automobile Dealers' Association. Auditorium Hall, Omaha, Neb.
April 5-12—Cycle and Automobile Exhibition at Athens, Greece, in conjunction with the Olympian games.
April 9-12—Beach Races, Atlantic-Pablo Beach, Fla. Jacksonville Automobile and Motor Club.
April 15—Touring Car Competition in France.
April 20-22—Touring Car Competition, France.
April (latter part)—Voiturette and Tri-Car Competition of L'Auto, France.
April 26-28—Beach Races, Atlantic City, N. J. Atlantic City Automobile Club.
May 3—Tourist Trophy Trials. Isle of Man, Great Britain. Automobile Club of Great Britain and Ireland.
May 6—Targa Florio Touring Car Race, Italy.
May 13—Voiturette Competition, Austria.
May 13-24—Motor Cycle Tour of France, starting from Paris. Auto-Cycle Club of France.
May 15-25—Milan Gold Cup Race, Milan, Italy. Italian Automobile Club.
May 15-31—Endurance Run, Italy.
May 27—French Motor Cycle Elimination Race.
June 1-3—Electric Vehicle Competition, France.
June 9-15—Herkomer Cup Competition for Touring Cars, Germany and Austria.
June 13-14—Provincial Cup Touring Car Competition, France.
June 17-24—Week of Marseilles, France.
June 26-27—Grand Prix Race, Sarthe course. Auto Club of France.
July 14-17—Automobile Racing at Ostend, Belgium.
July 23—Start of Glidden Tour from Buffalo, N. Y. American Auto Association.
August 5-8—Touring Car Competition, France.
August—Circuit des Ardennes Race, Belgium.
August 27-Sept. 2—Brescia, Sicily, Events, Automobile Club of Italy.
Sept. 1-10—Auvergne Cup Competition, France.
Sept. 2—Florio Cup Race, Brescia, Sicily. Automobile Club of Italy.
Sept. 18—Touring Car Competition of Provence, France.
Sept. 27—Tourist Trophy Race, Isle of Man, A. C. of G. B. & I.
Sept. 23—Semmering Hill-Climbing Competition, Austria.
Sept. 23—Auto-Cycle Club of France Cup Race.
Sept. 15-16—Mount Ventoux Hill Climbing Competition, France.
Sept. 9-20—Automobile Meet of Pallenza, Italy.
Sept. 10-15—Motor Cycle "Criterion," France.
Nov. 1-16—Automobile Show, Berlin, Germany.
Dec. 7-24—Paris Automobile Show.

The traffic department of the A. L. A. M. has secured a reduction in freight rates on tourists automobiles shipped west of Chicago. The former rate on automobiles from New York to San Francisco and from Chicago to San Francisco was the same, $150, and returning from San Francisco to Chicago it was $170, and from San Francisco to New York was $185. Under the new rate the tourist who has paid the full rate on his car going west from Chicago may upon returning get a half rate from San Francisco to Chicago of $85, but from Chicago east the full rate must be paid.

National Fall Show May Be Held in Buffalo

The Show Committee of the American Motor Car Manufacturers' Association met at Buffalo, N. Y., during the past month and looked over the ground there in regard to the holding of an outdoor show. In addition to finding exceptional outdoor facilities they also found that the new Armory Building at Buffalo, N. Y., has about 75,000 square feet of space, which is about as much space as that of the Madison Square Garden and the Sixty-ninth Regiment Armory combined.

The most probable arrangement which will be made for the fall show will be a combination indoor and outdoor show to take place at Buffalo, the new armory with its immense floor space to be used as the indoor part of the exhibition and the Kenilworth track to be used for demonstrating and furnishing additional attraction in the way of original feats and stunts. Nothing will be definitely decided until the meeting of the Committee of Management of the American Motor Car Manufacturers' Association on March 30.

N. A. A. M. Endorses Only New York and Chicago Shows for 1907

At the regular monthly meeting of the Executive Committee of the N. A. A. M. on March 7th the following resolution was passed regarding automobile shows:

"Whereas, in the opinion of this Executive Committee the local shows of 1906 have not been productive of benefits to the industry commensurate with the loss of time and expense involved; be it

"Resolved, that no shows shall be sanctioned hereafter except one annual show each at New York and Chicago, and that the resolution relative to exhibits at unsanctioned shows be continued in force."

The resolution referred to provides that no manufacturer who exhibits at an unsanctioned show shall be permitted to exhibit at a sanctioned show for a period of eighteen months.

The association realized approximately $25,000 from the Chicago show, one half of which will be distributed among those who had exhibited at at least one earlier Chicago show, held under the auspices of this association, in proportion to the amounts paid by each. The distribution will be made at an early date.

THE TEST CASE PROGRESSING.

The association's test case in New Jersey, designed to test the validity of laws which require an automobilist to take out more than one license and to determine other minor points, has progressed so rapidly that it has been heard in three courts and is now before the Supreme Court of New Jersey. It will reach the Court of Errors and Appeals in June, and it is therefore probable that within the brief space of six months the decision of the highest court in the state will have been secured.

TO SANCTION ALL CONTESTS.

As the number of contests promoted throughout the country threatens to become very burdensome the Executive Committee adopted a resolution.

"That this association is opposed to the holding of contests in the United States which have not been approved by its Executive Committee, and that it shall not be permissible for any member to take part in any unapproved contest under penalty of being debarred from participation in such events as may be held with the approval or under the auspices of this association."

A resolution was also adopted to counteract the growing tendency to give a longer guarantee than that adopted by the N. A. A. M. some years ago.

"That in the opinion of this Executive Committee it is unnecessary and unbecoming the dignity of a member of this association to publicly offer a guarantee exceeding 60 days, or varying in any essential detail from the guarantee adopted by this association."

Mr. W. E. Metzger has ben elected a member of the Executive Committee in place of Mr. R. D. Chapin, resigned.

Following is a list of committees appointed for the ensuing year:

Membership—Messrs. Davis, chairman, Owen and Bennett.

Show—Messrs. Budlong, chairman, White, Hilderbrand, Bennett and Metzger.

Freight and Transportation—Messrs. White, Chairman, Clifton and Innis.

Auditing—Messrs. Owen, chairman, Goss and Pope.

Good Roads—Messrs. Waldon, chairman, Davis and Bennett.

Legislation and Legal—Messrs. Bennett, chairman, Innis and Pope.

Contest — Messrs. Waldron, chairman, White, Kittridge, Davis and Pope.

Although the association has thus declared against its members exhibiting at local shows, it is understood that it has no intention of antagonizing the local shows, which are to be left entirely to local agents, who are to bear all expense of exhibiting at the same.

R. B. McMullin to Relinquish Management of the American Motor Car Manufacturers' Association

Mr. R. B. McMullin, who has for some time past been manager of the American Motor Car Manufacturers' Association, has accepted a very favorable proposition to become vice-president of the A. O. Smith Co. and to take general charge of the sales of that company. This has necessitated his resigning as manager of the American Motor Car Manufacturers' Association, the resignation to take place April 15. No one has been selected as yet to fill this position, although several applications have been made for the position, and Mr. McMullin will lend his assistance to the association at any time that it may be required until a successor has been decided upon.

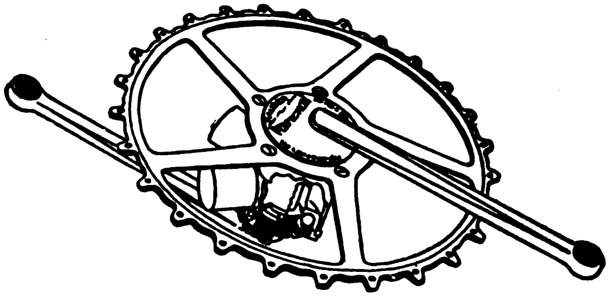
During 1905 France exported to other countries automobiles to the value of $20,080,000. Of these only $1,329,400 came to the United States.

FAUBER

REGISTERED

TRADE MARK

[PATENTED]



"PERFECTION"

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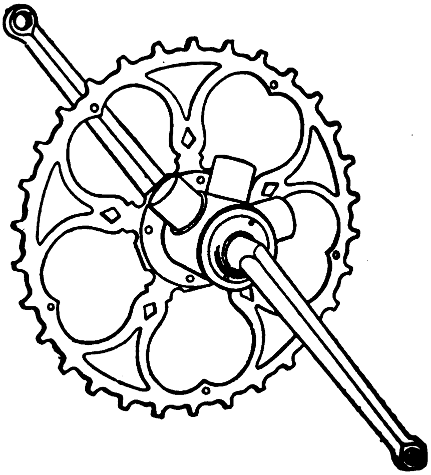
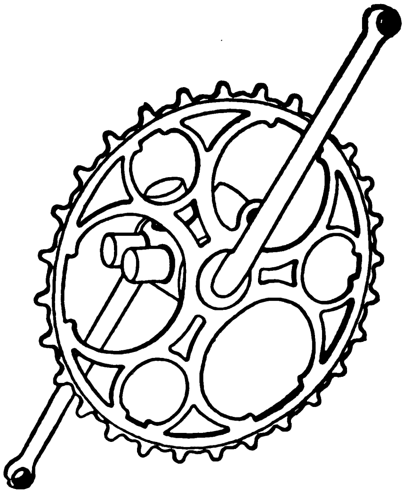
are the standard of the world because no others are used on the best bicycles. Their simplicity of construction and reliability make them the ideal equipment for high-grade wheels.



"STANDARD"



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Great Western Mfg. Company

La Porte, Indiana

EXPORT REPRESENTATIVES:

Guiterman, Rosenfeld & Co.

35 South William St., N. Y. City

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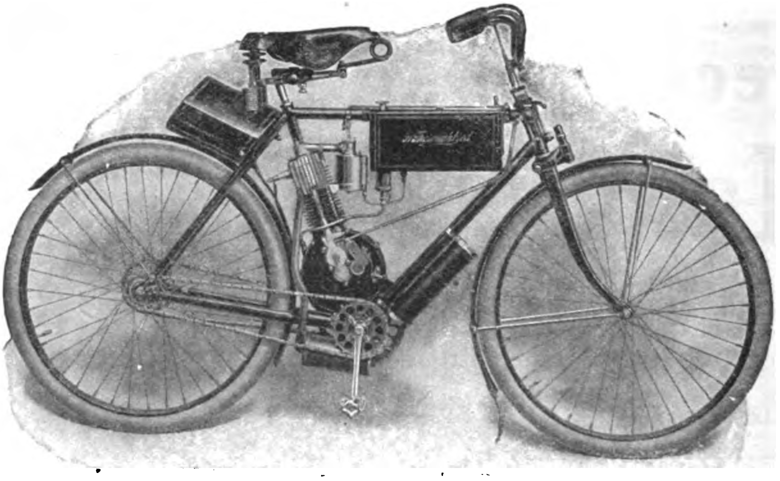
The Thoroughbred

The 1906 THOROUGHBRED

is worth crowing about.

In the races held by the Los Angeles Motor Cycle Club at Long Beach, Cal., the "**THOROUGHBRED**" won the "**free for all**" race and made the fastest time of all motor cycles, covering 1½ miles on a sandy beach in 1:43 and outdoing all its competitors.



Our new model is a triumph in motorcycle building. We have improved on earlier models with the result that the rider of **this** year's "**THOROUGHBRED**" will get comfort and perfection in the highest degree.

The following new features which have been added will convince you that if you buy the "**THOROUGHBRED**" you buy a superior motor cycle:—

The New Patent Duplex Spring Fork, which has twice the strength and spring of other forks, with fewer parts; improved battery case, pump oil feed, improved intake head, double grip control. Our patent adjustable lamp bracket, patent collapsible luggage carrier, and tandem attachments will win your admiration. The horse power is fully 2¼, and the two inch tires have been replaced by 2¼".

The new **1906 THOROUGHBRED** is the most complete, as well as the most perfect motorcycle in the world. Convince yourself by comparison.

Send for full particulars.

READING STANDARD CYCLE MFG. CO., Reading, Pa.

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CYCLE AND
AUTOMOBILE
TRADE JOURNAL

ENTERED AT THE PHILADELPHIA POST OFFICE
PUBLISHED MONTHLY
TRADE ADVERTISING AND PUBLISHING CO.
1213 Filbert St., Philadelphia, Pa.

JAMES ARTMAN President
GEO. H. BUZBY Vice-President
C. A. MUSSELMAN Sec. and Treas.

Western Representative J. WALTER SCOTT
Eastern Representative F. M. DAMPMAN

Yearly Subscription - - - - - $1.00
Foreign Subscription - - - - - 2.00
Single Copies - - - - - - 15 cts

Change of advertising copy must reach this office not later than the 15th of each month. New advertisements will be accepted as late as the 20th

JAMES ARTMAN - EDITOR

Philadelphia, April 1, 1906

The October Outdoor Show

The trade generally have taken up with enthusiasm the movement of the American Motor Car Manufacturers' Association for a show to be held in the early fall. Although some are inclined to criticise the open air proposition, all favor the date. The dealers are especially pleased at this move, and those manufacturers who are prepared to make their agency deals at that time of the year will undoubtedly secure the pick of the agents. Opinion is divided as to whether any retail sales will be made so early, but if the experience of the exhibitors at the English show last November is an indication, it is to be expected that retail sales will be just as numerous in October as they are in January, for the report of the English show disclosed the fact that there were more retail sales made of 1906 cars at the November, 1905, show than there were of 1905 cars at the Februaary, 1905.

It is a fact that retail purchasers like to buy early when they can buy new models early. The driving season of 1906 will be practically at an end in October, and the motorists will have their opinions formed as to what they want for next year. In fact, they will no doubt be more in the humor of buying in October than they would be in January, after their machine has been laid up for two or three months, for in that length of time their enthusiasm will have had time to cool. Furthermore, when they order machines in January they are forced to wait for them until March and April, and even longer, and every purchaser knows what an annoyance it is to be compelled to wait for a new car when fine days are passing by. When he orders his car in October he can depend upon getting it early enough to take advantage of every fine spring day.

The exact date and location of the show has not as yet been decided upon, but it is likely to be announced almost any day. From the action taken by the N. A. A. M. at the recent meeting of its Executive Committee it seems likely that the Licensed Association will not take part in any other shows except those held at New York and Chicago next January and February. While this resolution may have been adopted for the purpose of discouraging the American Motor Car Manufacturers in their move, we do not believe that it will have any such effect, as the American Motor Car Manufacturers' Association evidently did not expect the Licensed Association to give them any assistance in the matter. The Licensed Association may have occasion to change their policy on the matter of the fall show, for if the independent makers alone exhibit in the fall, it is quite likely that a number of the agents who have heretofore represented licensed makers, will take hold of independent lines because of the advantage gained by earlier deliveries and a longer selling season.

From present indications it is quite probable that the first fall national show will be a combination indoor and open air affair, and this innovation certainly looks like a good one. The propositon is to hold the show proper in the immense new armory at Buffalo and supplement this with demonstrations and feats at the Kenilworth race track.

If this programme is followed there is no doubt but that many automobilists will tour to Buffalo to see the show. There is also a chance that one of the national organizations may promote a touring competition to finish at Buffalo.

The 60 Day Guarantee

The Executive Committee of the National Association of Automobile Manufacturers, at a recent meeting, adopted a resolution condemning the practice of certain manufacturers giving a longer guarantee on their cars than the standard 60 day guarantee, which was adopted by the National Association of Automobile Manufacturers several years ago. While this form of guarantee was undoubtedly adopted because of the unreasonable claims made by owners who failed to take proper care of their machines, it is a fact that a large majority of the makers of the best cars do not adhere to this 60 day guarantee, but replace defective parts, or parts which have proven themselves inadequate to the service required of them, without reference to the length of time the car has been used. Sometimes these replacements are made free of charge even after the car has been in use for over a year, and, strange to say, some of the men who were instrumental in having this resolution adopted are among those who are the most liberal in the treatment of their own customers in these matters.

A strong argument against the 60 day guarantee is the fact that outsiders will consider it a very short period to guarantee the efficient service of a machine so costly as the motor car. Many prospective buyers of automobiles are conversant with the guarantees given with machinery of all kinds and with other high class articles, and it is almost a universal custom among manufacturers of such articles to guarantee their machines against defects for the period of a year, and therefore many intelligent men have formed the conclusion that automobile manufacturers as a rule have but little confidence in their own product. We are therefore of the opinion that the N. A. A. M. is making a wrong move in sticking to the 60 day guarantee so strenuously, especially as it is merely a form which is not actually lived up to. The industry as a whole should have the benefit of the confidence which a longer standard guarantee would give. New cars are often not used for fully 60 days after they are delivered, sometimes on account of bad weather and at other times on account of the absence from home of the purchaser or pressure of business. In fact, all cars delivered between the first of December and the first of April cannot be said to have had an adequate trying out, inasmuch as no long trips are attempted in those months.

Would it not be better to deal with each owner who makes unreasonable claims in such a manner as befitted his particular case, than to put the whole industry at a disadvantage by adopting so short a guarantee?

The announcement of an English manufacturer that he will hereafter guarantee his cars for three years against constructional faults or failures is very apt to place the 60-day guarantee of the American manufacturers in a very bad light, as the automobile buyer will undoubtedly take for granted that the manufacturer who is only willing to guarantee his machines for 60 days has not as much confidence in his product as the one who gives a guarantee for three years.

Why Foolish Extravagance

Automobile agents and dealers generally are guilty of gross extravagance in the handling of their cars, and the employees of garages, chauffeurs and owners themselves are guilty of gross carelessness in the handling and care of fine cars.

Owing to the rapidity of the growth of the automobile industry, combined with the supposedly large margin of profit, there is a tendency on the part of many makers, dealers, and their employes, to view with indifference the high prices paid for automobiles, and the value they represent. It is noticeable that subordinates, or employes holding responsible positions, are allowed the use of cars costing several thousands of dollars, running them hundreds of miles for practically their own pleasure. The wear and tear on the machine in general, and the tires in particular, represent an expense to the owner of the car far in excess of what would be tolerated in any other line of business.

Would any manufacturer of fine carriages allow one of his fine broughams costing from $500 to $1500 to be used by an employee for his own pleasure, would any vehicle dealer allow any of the fine carriages in his stock to become second hand through his own or his employees' use, would any livery man think of handling the fine private carriages of his patrons in the way automobiles worth five to ten times as much, are handled in garages? Would the owner of one of these fine carriages allow his coachman to drive around town in it doing errands and the like?

Would piano manufacturers or dealers allow their employees to have free access to their pianos? Notwithstanding the fact that the use of the carriage or piano would do them little or no harm, such abuses would not be tolerated. Fine carriages receive careful attention from manufacturer, dealer, owner, and coachman. Pianos are handled as a fine piece of furniture should be, yet motor cars, which represent on the average ten times the cost, receive only about one-tenth the care. And the misuse of an automobile is much more detrimental, for, in the first place, it is a piece of delicate machinery, and in the second place it is a fine carriage and the wear and tear on tires alone represents quite a large sum.

Instances of extravagance in this line are shown in the many ways in which the chauffeur or employee indicates his indifference in the care of a car. They are likely to strike matches on any finely enameled part, will touch the magnificently upholstered portions of the car with grimy, greasy hands, will climb in and out of the tonneau carelessly, scratching the enameled portions, and in many ways show their total disregard for the high-priced automobile. In no other line would such extravagance, carelessness or indifference be tolerated, and why encourage this extravagance by overlooking or sanctioning these wrongs in the automobile industry. The manufacturer or dealer who wishes to stand the hardships of keener competition in the future, must, at the present, put his business upon a practical basis, and watch all details, because one form of extravagance, though in itself comparatively insignificant, leads to all forms of extravagance, which, combined, are a great handicap to any business.

Many new cars are needlessly used and their value impaired. The loss caused to the industry through this fast and loose policy is enormous every year and the day will surely come when these losses will be regretted.

American Cars for the 1906 Vanderbilt Race

Announcement has already been made by the E. R. Thomas Motor Co., the Maxwell-Briscoe Co., and the Oscar Lear Automobile Co. to the effect that they are building several cars each for the special purpose of competing in the 1906 Vanderbilt Cup Race. While the Thomas Co. participated in the eliminating contest last year, the machine used was not a specially built racing car. This year the Thomas cars will be of very much higher power than the one used last year. The Maxwell cars will also be of sufficient power to give a good account of themselves, and the Oscar Lear Co. are building air-cooled cars of 90 and 120 H. P. It is also rumored that the Locomobile Co., Geo. N. Pierce Co., the Packard Motor Car Co., Peerless Motor Car Co. and the Royal Motor Car Co. all have high powered racing cars under way, built especially for the same race.

It is especially encouraging that a good number of America's best makers are preparing to secure this trophy, and it is to be hoped that all of these cars will be finished long enough in advance of the rate, to be thoroughly tried out so that any defects which are found can be corrected before the preliminary trials.

The large number of racing cars being built for this year's Vanderbilt Cup Race proves that the American manufacturers have realized that the foreign makers obtained a foothold in this country through their attention to the building of racing machines. We do not for a moment doubt that when the American makers set out to build American racing cars in earnest they will produce machines that will beat anything on earth. This has been the result in all other lines of machinery manufacture and cannot fail to be the result with automobiles.

Class Legislation Vnconstitutional

Several months ago we noticed editorially the fact that the town council of Reidsville, N. C., had passed an ordinance prohibiting the use of motor cycles on the streets and highways of that borough, and we urged the Federation of American Motor Cyclists to contest this ordinance, as to its constitutionality. David L. Carroll, a Reidsville motor cyclist, joined the Federation, and through the advice of the federation's counsel, John C. Higdon, he was arrested and fined. The case was appealed, and the decision has just been handed down by the Superior Court of Rockingham County, N. C., ruling that the ordinance is clearly unconstitutional and that no law can be passed that prohibits the use of motor cycles on the public streets and highways.

This is a start in the right direction, but it is not enough. It is announced that the test case started by the National Association of Automobile Manufacturers some time ago has been argued in three courts and is now before the Supreme Court of New Jersey, and the final decision on it is likely to be reached within a few months. Should this result in a victory for the automobilists it should be followed by similar test cases in every State in the union, if necessary, so as to knock out the various conflicting license laws which have been enacted. If this course is pursued energetically there is no doubt but that the tide of adverse legislation would be stemmed.

The next laws to be tested should be the new laws which are proposed in New Jersey and New York, which in their present shape contain provisions which are more obnoxious than anything which has heretofore been enacted, and many of which will undoubtedly not stand a contest in the courts. The endeavor to assess tourists' motor cars in Los Angeles, Cal., is another instance showing to what lengths anti-automobilists are going.

How We Grow

We submit the following statement of the circulation of the Cycle and Automobile Trade Journal on March 1st for the past five years.

	Paid subscription	News-stand sales	Total paid	Total circulation
March, 1902...	5,340	1,000	6,340	10,804
" 1903...	6,575	1,825	8,400	12,304
" 1904...	8.057	3.000	11,057	13,170
" 1905...	10.020	3,400	13.420	16,298
" 1906...	**13,046**	**5,300**	**18,346**	**24,955**

The above record of the growth of the circulation of the Cycle and Automobile Trade Journal during the last five years surely indicates that we are printing the kind of information that the people want. Although our journal is essentially a trade publication, it is a fact that by far the greater percentage of its circulation is among individuals. This must necessarily be the case, as at the present time there are only between 6000 and 7000 concerns in the trade and if our journal went to every one of these tradesmen less than one third of our circulation would be consumed by them and over 2-3 would therefore go among individuals. In fact by careful analysis we find that the proportion of trade readers is smaller than this, being about 6000 or about 25 per cent. only of our March, 1906, edition, leaving a circulation of 18,000 among individuals.

The increase in the circulation of the "Journal" is more rapid than that of any other automobile publication in the world. The elapsed time between March, 1902, and March, 1906, is but four years, yet in that time we have tripled our paid circulation. A very noticeable fact is that the greatest percentage of increase is in the news stand sales, which certainly indicates a growing popularity among individual readers. Among these are also to be numbered many prospective buyers who are looking for information before making a selection.

The Local Show Situation

The resolution of the National Association of Automobile Manufacturers to sanction no show except the annual shows at New York and Chicago, and forbidding any of their members to participate in any show except these two, places the burden of the local shows entirely upon the dealers, except for such assistance as they may be able to secure from the few unallied manufacturers of automobiles and accessories, as the Motor and Accessory Manufacturers and Tire Manufacturers' Association have previously practically taken the same action, and there is no doubt but that the American Motor Car Manufacturers' Association will do the same. The fact of the matter is that the manufacturers have found the expense and the time spent on the local shows to be entirely too great for the benefit they derive from them.

We have all along contended that the local show would be supported entirely by the local dealer, for if it will not pay him it surely will not pay the manufacturer. The only object of a local show is to promote local sales, and, of course, local sales benefit the local dealers and if the number of sales secured through a show will not warrant the expense that is entailed by the holding of it, it is certainly a failure. We do not mean to say that all local shows are failures. In fact, we think that most of them thus far have been successful, from the standpoint of sales made and additional local interest and enthusiasm aroused, but as this is to the benefit of the dealer almost entirely, the dealer should bear the expense. There is no doubt but that some of the shows have been promoted on too lavish a scale, and this new rule of placing all of the expense upon the dealer will undoubtedly result in more judicious expenditures in the matter of decorations, etc.

"Considerations of Motor Car Elements"

The series of articles under the above title, first installment in this issue, by Hugh Dolnar, will interest all students of motor car design. The writer is known to our readers as a close observer and writer of clearly detailed car descriptions. He also has very strong convictions as to the value of the 2-cycle air-cooled motor, spiral gears, full elliptic springs and 3-point suspension. Should any of our readers dissent from the conclusions reached in these articles the columns of the Journal are open to all, in the full belief that free discussion and interchange of opinion is the shortest road to the ideal motor car, which is now sought by the best mechanical talent of both Europe and America.

594 Types of Cars Described

In the "6th Annual Motor Car Review," published last month, there were 594 types of motor cars of American manufacture described and illustrated. Of these 467 were pleasure vehicles, divided into 390 gasoline, 60 electric and 17 steam, ranging in price from $250 to $18,000. 127 were commercial vehicles, divided into 81 gasoline, 41 electric and 5 steam, from $750 to $6,000. This Review shows an increase in the number of models of about 40 per cent over last year, most of these being in the gasoline vehicles and in the commercial vehicles.

If our readers will take this Review as a basis and add to it the vehicles which we describe in this issue and coming issues, they will always have before them a complete resume of all the motor cars on the American market.

Appreciating that many of our new subscribers might desire to secure a copy of this "Motor Car Review" number we have reserved several hundred copies, which we can supply to new subscribers for the next few weeks. We therefore advise new subscribers to start their subscription with the March number.

New York automobile dealers will hold an open air automobile carnival May 24, 25, and 26 at Empire track.

Selden Association Statistics

Mr. M. J. Budlong, president of the Electric Vehicle Co., in his testimony in the pending Selden patent cases, has given the following data which will be of interest to the trade generally. He states that the total number of vehicles manufactured and imported under the Selden license from January 1, 1903, to January 1, 1906, was 41,696, valued at $63,141,437.52, and that the royalties paid on them was $814,183.52. Of the total number for the three years, 17,840 were manufactured during 1905, which was an increase of 32.5 per cent. over the sales of 1904, while the increase in value was 66.2 per cent. The average selling price for cars in 1903 was $1170, in 1904 it was $1422, in 1905 it was $1784, while the average selling price of the imported cars was $6710.

The above figures indicate that as far as the manufacturers who are members of the Selden Asssociation are concerned the prices of their cars have been steadily increasing, but those who are familiar with trade conditions know that the majority of the manufacturers who are members of the Selden Association are makers of the high-priced cars, while the majority of the makers outside of the association are manufacturers of low-priced cars. Therefore the above statistics should not be taken as representing the entire production of cars, for it is estimated that the independent concerns have produced during 1905 almost 20,000 machines, and as the average price of these is very much less than the average price of the licensed cars, the figures showing the average price of all told, both licensed and unlicensed combined, would be very much lower than the above, and we doubt whether there would have been any appreciable increase in the average price, as the number of low-priced machines made by independents has increased very rapidly in the last three years.

Studebakers Interested in the Garford Co

The Garford Co., of Elyria, Ohio, has increased its capital stock from $400,000 to $600,000, the Studebakers, of The Studebaker Automobile Co., South Bend, Ind., becoming large stockholders in the company. It is stated that their investment in the Garford Co. is more than a quarter million dollars. A large new building with 100,000 feet of floor space will be immediately added to the plant, and equipped with the latest tools and machinery, and more attention than ever will be given to the production of commercial vehicles. The combination of the Garford and Studebaker interests is certainly a very important one. The Studebaker Co. has been among the foremost wagon builders of the country for a generation, and the Garford Co. holds as important a position in the manufacture of the power equipment and chassis of automobues.

The Lozier Motor Co., of New York City, has been admitted to membership in the Association of Licensed Automobile Manufacturers, giving this association a membership of thirty-eight.

Boston's Exhibition of Motor Cars and Motor Boats Magnificent

Magnificent both in appearance and proportions the Boston Automobile and Motor Boat Show, March 10-27, probably ranks second only to the National Shows. It occupied the two largest buildings in Boston, Mechanics' Hall and Symphony Hall, both of which, while not overcrowded, were comfortably filled with exhibits including all the 1906 cars, parts and accessories shown elsewhere, as well as a number of entirely new ones.

Among the new cars shown were the Shawnut made by the Shawnut Motor Co., 901 Boylston St., Boston, Mass.; the Ross Steamer made by Louis Ross of Newtonville, Mass., and the "American" Gasoline Car made by American Motor Car Co. of Indianapolis, Ind. The new accessories included a "Victory" shock absorber made by Hill Motor Car Co., Haverhill, Mass.; iron tire pneumatic wheel made by Iron Tire Pneumatic Wheel Co. of New York City; Anderson spark plug made by Anderson Spark Plug Co. of Boston; Eco-Safety generator made by Eco Mfg. Co., 53 State St., Boston; new speed indicator marketed by Chandler & Farquhar Co., 36 Federal St., Boston.

The decorations were exceptionally tasteful and harmonious. The two main aisles on the main floor of Mechanics' Hall which cross each other at right angles in the middle of the building forming a cross, were lined with rows of imitation marble pillars which supported an arbor of Venetian design. On the arbor were neatly and naturally arranged imitation grape vines, the leaves of which partly concealed hundreds of electric bulbs which diffused a soft light. The floors were carpeted in green, the walls red burlapped and the space divisions were white and gold, making altogether, a pleasing effect.

The entire balcony was given up to accessory exhibits, prominent among which was that of Gray & Davis on account of its size and attractiveness. Besides many accessory exhibits were scattered around so that the entire accessory exhibit was as large perhaps as at New York or Chicago.

Symphony Hall had less temporary decoration, but as it is a more attractive building to commence with, the effect was as pleasing. The Symphony Hall overflow show did not open till the 12th, because the hall was engaged for the 10th. At both halls a great jam of people turned up on the opening nights and the attendance was good throughout the show period. The total number of cars shown was about 760, values running from $400 to $12,000. Nearly all were of American make.

About 60 Motor Boat exhibitors occupied the basement of Mechanics' Hall.

A summary of the exhibits follows:—

COMPLETE AUTOMOBILES.

Adams-Sutton Motor Co., Boston, Mass.—Oldsmobiles made by the Olds Motor Works, of Lansing, Mich.

American Motor Car Co., Indianapolis, Ind.—The "American," a new gasoline touring car shown in our March number, page 107, and to be fully described in a future issue.

Babcock Electric Carriage Co., Buffalo, N. Y.—Babcock electric vehicles.

Baker-Comerais Motor Car Co., Massachusetts Ave., Boston, Mass.—Premier air-cooled car made by the Premier Motor Mfg. Co., Indianapolis, Ind.

Bangs, A. R., 801 Boylston Ave., Boston. Mass.—Franklin air-cooled cars made by the H. H. Franklin Mfg. Co., Syracuse, N. Y., and the Darracq gasoline cars made in France.

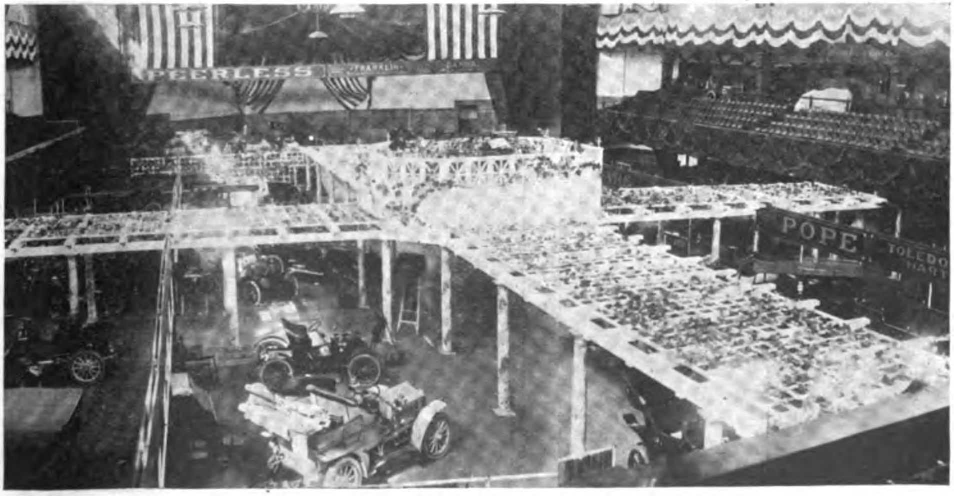
Berkshire Automobile Co., Pittsfield, Mass.—Berkshire gasoline cars.

Blake, E. P. & Co., 21 Hawkins St., Boston, Mass.—Jackson cars made by the Jackson Automobile Co., Jackson, Mich.

Blomstrom, C. H. Co., Detroit, Mich.—"Queen" gasoline cars.

Boston Automobile Exchange, 173 Berkley St.—Crawford gasoline cars made by the Crawford Automobile Co., Hagerstown, Md., and the Columbus electric cars made by the Columbus Buggy Co., of Columbus, O.

Boston Motor Co., The, 43 Columbus Ave., Boston, Mass.—Acme motor cars made by the Acme Motor Car Co., of Reading, Pa., and the



General view Boston Automobile Show. Mechanics' Hall, showing Original Scheme of Decorations.

Merkel cars made by the Merkel Motor Co., Layton Park, Milwaukee, Wis.

Breed, E. S., 41 Columbus Ave.—Haynes gasoline cars made by the Haynes Automobile Co., Kokomo, Ind., and the Elmore 2-cycle cars made by the Elmore Mfg. Co., Amanda St., Clyde, O.

Brown, Geo. M., 43 Columbus Ave., Boston, Mass.—Showed the Apperson cars made by the Apperson Bros. Automobile Co., of Kokomo, Ind.

Buick Auto Agency, 541 Tremont St., Boston, Mass.—Buick gasoline automobiles made by the Buick Motor Co., Jackson and Flint, Mich.

Butler Motor Car Co., 998 Boylston St.,—Cleveland gasoline cars made by the Cleveland Motor Car Co., Cleveland, O.; the Richard-Brasier cars made in France; Pierce-Racine gasoline cars made by the Pierce Engine Co., Racine, Wis., and "Rapid" commercial trucks made by the Rapid Motor Vehicle Co., of Pontiac, Mich.

Clark, Edward S.—Clark steam car.

Coburn, A. J., 43 Columbus Ave., Boston, Mass.—The Upton cars made by Lebanon Motor Co., of Lebanon, Pa., and the Constanti electric cars.

Coleman, H. P., 66 Stanhope St., Boston, Mass.—Duryea gasoline cars made by Duryea Power Co., of Reading, Pa.

Columbia Motor Vehicle Co., 94 Stanhope St., Boston, Mass.—Exhibited the Columbia gasoline and electric cars, made by Electric Vehicle Co., of Hartford, Conn., including commercial cars.

Corwin Mfg. Co., Peabody, Mass.—Gasaulec cars, 1906 models to be described in a future issue of the Journal.

Crown Motor Car Co., Motor Mart, Boston, Mass.—Glide gasoline cars made by The Bartholomew Co., of Peoria, Ill.

Detroit Auto Vehicle Co., Detroit, Mich.—Crown gasoline cars.

Dunham, Geo. J., 182 Columbus Ave., Boston, Mass.—Royal tourist cars made by Royal Motor Car Co., of Cleveland, O.

Duquesne Co., The, 112 E. 75th St., New York.—The Duquesne gasoline car made by Duquesne Construction Co., Jamestown, N. Y.

E. H. V. Co., Middletown, Conn.—"Compound" gasoline cars.

English Daimler Co., Times Bldg., N. Y.—English Daimler, C. G. & V. and Decauville cars, imported.

Essex Motor Car Co., 60 State St., Boston, Mass.—The Essex, a new steam car, illustrated with specifications in our Motor Car Review, page 152, March Journal, and to be described in detail in a future issue.

Ford Motor Car Co., 149 Columbus Ave.—A full line of Ford gasoline cars made by Ford Motor Co., Detroit, Mich.

Fosdick, Harry, Co., 53 Stanhope St., Boston, Mass.—F.I.A.T. (Italian) cars and Studebaker electric and gasoline cars; the latter made by Studebaker Automobile Co., South Bend, Ind.

Fuller, A. T., Boston, Mass.—Packard touring cars made by the Packard Motor Car Co., of Detroit, Mich., and the Cadillac cars made by the Cadillac Motor Car Co., of the same city.

Grout Bros. Automobile Co., Orange, Mass.—Grout gasoline cars.

Harrison Wagon Co., Grand Rapids, Mich.—Harrison gasoline cars, described in this issue.

Henshaw, C. S., 288 Columbus Ave., Boston, Mass.—Thomas Flyers made by the E. R. Thomas Motor Car Co., of Buffalo, N. Y.

Imperial Automobile Co., 1024 Boylston St., Boston, Mass.—Aerocars (air-cooled), made by Aerocar Co., of Detroit, Mich.; Dolson gasoline cars made by Dolson Automobile Co., Charlotte Mich.; St. Louis "Rigs that Run," made by St. Louis Motor Car Co., of Peoria, Ill.; Argus and Martini cars, the two latter being of foreign make.

Iroquois Motor Car Co., Seneca Falls, N. Y.—Iroquois gasoline cars.

Jeffery, Thos. B. & Co., Kenosha, Wis.—Rambler gasoline cars, exhibited by their Boston Branch, 145 Columbus Ave.

Jenkins & Sheldon, 304 Columbus Ave., Boston, Mass.—Showed the Mitchell cars made by the Mitchell Motor Car Co., of Racine, Wis.

Johnson Service Co., Milwaukee, Wis.—The Johnson steam carriage.

Kimball, E. T. Co., 147 Columbus Ave., Boston, Mass.—Corbin air-cooled cars made by the Corbin Motor Vehicle Corporation, New Britain, Conn.

Knox Motor Truck Co., Springfield, Mass.—Showed the Atlas gasoline trucks.

Linscott Motor Car Co., 163 Columbus Ave., Boston, Mass.—National cars made by the National Motor Vehicle Co., 1003 E. 22nd St., Indianapolis, Ind., and the Reo gasoline cars made by the Reo Motor Car Co., Lansing, Mich.

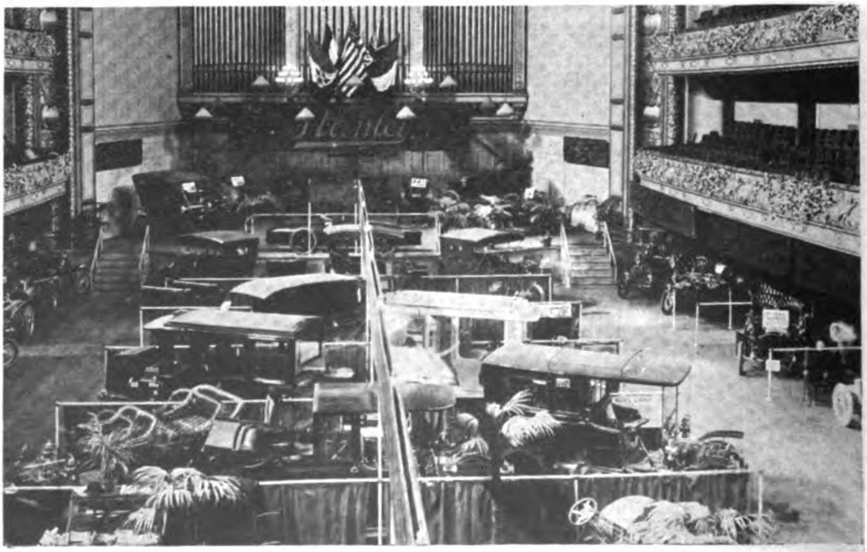
Locomobile Co. of America's Boston Branch, 15 Berkeley St.—Exhibited the Locomobile gasoline cars.

Maguire, J. W. Co., 745 Boylston St., Boston, Mass.—Pierce-Arrow gasoline cars made by the Geo. M. Pierce Co., of Buffalo, N. Y., and the Baker electric cars made by the Baker Motor Vehicle Co., of Cleveland, O.

Matheson Motor Car Co., Holyoke, Mass.—Matheson gasoline cars.

Mercedes Import Co., Times Bldg., N. Y.—Mercedes cars made in Germany.

Mills-Kennedy Co., The, 733 Boylston St.,



General view of Symphony Hall, portion of Boston Automobile Show.

Boston, Mass.—Welch cars made by the Welch Motor Car Co., of Detroit, Mich.

Moore & Smith, 38 Columbus Ave., Boston, Mass.—Showed the Autocars made by the Autocar Co., of Ardmore, Pa.

Morrison-Tyler Motor Car Co., Massachusetts Ave., Boston. Mass.—Maxwell gasoline pleasure and commercial cars made by Maxwell-Briscoe Motor Co., Tarrytown, N. Y.; Rainier gasoline pleasure cars, made by the Rainier Co., 50th and Broadway, N. Y., and Marion air-cooled pleasure cars made by Marion Motor Car Co., Indianapolis, Ind.

Mors Automobile Co., 541 Tremont St., Boston, Mass.—Mors gasoline cars (French).

Napier Co. of America, 743 Boylston St., Boston, Mass.—Napier gasoline cars.

Northern Automobile Agency, Motor Mart, Boston, Mass.—Northern gasoline cars made by Northern Mfg. Co., Detroit, Mich.

Page Motor Vehicle Co., 127 Summer St., Providence, R. I.—The "Page" air-cooled runabout.

Peerless Motor Car Co.'s Boston Branch, 178 Columbus Ave.—Peerless gasoline cars.

Pope Mfg. Co.'s Boston Branch, 223 Columbus Ave.—Full line of Pope cars, including Pope-Toledo gasoline, Pope-Hartford gasoline, Pope-Tribune gasoline and Pope-Waverly electric.

Randliff Motor Car Co., 26 Columbus Ave., Boston, Mass.—Frayer-Miller cars made by the Oscar Lear Automobile Co., of Columbus, O.; the Ardsley cars made by the Ardsley Motor Car Co., Yonkers, N. Y.; the Panhard car made in France, and the Stoddard-Dayton gasoline cars made by Dayton Motor Car Co., of Dayton, O.

Reed-Underhill Co., 222 Columbus Ave., Boston, Mass.—Knox cars made by Knox Automobile Co., of Springfield, Mass., and the Stearns touring cars made by the F. B. Stearns Co., of Cleveland, O.

Ross, Louis, Craft St., Newtonville, Mass.—The Ross steam cars, described in this issue.

St. Louis Motor Car Co., Peoria, Ill.—St. Louis "Rigs that Run," gasoline cars.

Saunders, C. H., 9 Everett St., Melrose, Mass.—Moline cars made by the Moline Automobile Co., East Moline, Ill.

Shawmut Motor Co., 901 Boylston St., Boston, Mass.—The Shawmut, a new gasoline car to be described in a future issue of the Journal.

Skinner, K. A., 179 Clarendon St., Boston, Mass.—The De Dion Bouton cars made in France.

Smith, Benj., 319 Columbus Ave., Boston, Mass.—Showed the "Compound" gasoline cars made by the E. H. V. Co., of Middletown, Conn.

Stanley Motor Car Co., Newton, Mass.—Stanley steam cars.

Stratton, H. C. & Co., 43 Columbus Ave., Boston, Mass.—American Mercedes car, made by Daimler Mfg. Co., Long Island City, N. Y.

Sturtevant Mill Co., Harrison Sq., Boston, Mass.—"Sturtevant Automatic" gasoline cars.

Waltham Mfg. Co., Waltham, Mass.—Waltham-Orient gasoline motor cars.

Wayne Automobile Co.'s Boston agency, 509 Tremont St.—Showed the Wayne, a gasoline car made by Wayne Automobile Co., of Detroit, Mich., in six models.

White Sewing Machine Co.'s Boston Branch, 320 Newbury St.—A full line of White steam cars, including both open and closed types.

Wing, F. E. & Co., Boston, Mass.—Marmon air-cooled cars, made by Nordyke & Marmon, of Indianapolis, Ind.

Winton Motor Carriage Co.'s Boston Branch, 1 Stanhope St.—The Winton Model K.

AUTOMOBILE PARTS AND ACCESSORIES.

American Electrical Novelty Mfg. Co., 304 Hudson St., New York.—"Ever-ready" dry cells, gasoline gauges, detector, ammeters, portable electric lamps, etc.

American Metal Polish Co., 89 Winslow St., Somerville, Mass.—Metal polish.

Anderson Spark Plug Co., 701 Colonial Bldg., Boston, Mass.—The Anderson spark plug, to be described in a future issue of the Journal.

Angier Co., 735 Boylston St., Boston, Mass.—Oleo spark plugs and other imported specialties; also Diamond chains and Witherbee storage batteries.

Atlantic Co., The, Amesbury, Mass.—Atlantic spark plugs.

Atwood Mfg. Co., Amesbury, Mass.—Full line of automobile lamps and generators.

Autobed Co., 36 Columbus Ave., Boston, Mass.—The "Autobed," an apparatus comprising four jacks on one frame or bed, used to hold the car up off the tires in the garage.

Auto Goods Co., Providence, R. I.—Tire repair plugs and tools.

Badger, E. B. & Sons Co., 51 Pitts St., Boston, Mass.—Hoods, fenders, tanks, mud guards, metal dashes, etc.

Baum's Castorine Co., 43 Columbus Ave., Boston, Mass.—Soaps, oils, greases and graphite.

Bay State Hardware Co., 1321 Washington St., Boston, Mass.—"Kleno," a compound for removing dirt, machine grease, etc., from the hands.

Boston Auto Gage Co., 613 Old South Bldg., Boston, Mass.—"Triumph" gasoline gages.

Boston Insurance Co., 137 Milk St., Boston, Mass.—Insurance.

Boston Cycle & Sundry Co., 47 Hanover St., Boston, Mass.—Line of automobile supplies.

Boston Mechanical Co. (H. E. Whiting), 11 Ware St., Cambridge, Mass.—Menn's carburetor, described in this issue.

Boston Tire & Rubber Co., 184 Friend St., Boston, Mass.—The Fawkes airless clincher tire for automobiles.

Bowser, S. F. & Co., 255 Atlantic Ave., Boston, Mass.—A full line of gasoline storage outfits.

Bullard, J. H., Springfield, Mass.—Bullard speed recorder.

Burgess, Hollis, 10 Tremont St., Boston, Mass.—"Mohler & Degress" gasoline automobile motors made by F. A. Seitz & Co., of Newark, N. J.; also "Trebert" gasoline auto-

WHITE STEAM
ARS

The exhibit of the White Sewing Machine Co. at the Boston Show. This photgraph illustrates the style of decoration which is followed out throughout the show in both the Mechanics Hall and Symphony Hall.

mobile motors made by Brownell-Trebert Co., of Syracuse, N. Y.

Champion, Albert Co., Tremont Garage, Boston, Mass.—Spark plugs, spark coils commutators, magnetos, ignition apparatus and all electric supplies for automobiles.

Chandler & Farquhar, 36 Federal St., Boston, Mass.—"Allen" high speed ball bearing drill presses, "Federal" speed and distance meters, "Yankee" motor clocks, cleansing compounds, rust preventatives and other sundries.

Chase, S. C. & Co., 129 Washington St., Boston, Mass.—Robes and top fabrics.

Chesterton, A. W. & Co., 64 India St., Boston, Mass.—Line of oils, greases and metal polishes.

Coates Clipper Mfg. Co., Worcester, Mass.—Coates flexible shafts and Coates grinders and burnishers.

Coleman, H. P., 66 Stanhope St., Boston, Mass.—Line of automobile sundries.

Columbia Vehicle Tire Co., 97 Haverhill St., Boston, Mass.—Automobile tires.

Connecticut Telephone and Electric Co., Meriden, Conn.—Connecticut spark coils, switches and current indicator.

Coops, Chas. W., 3 Appleton St., Boston, Mass.—Line of top fixtures.

Cowles, C. & Co., Walter and Chestnut Sts., New Haven, Conn.—Automobile mountings and lamps.

Cramp, Wm. & Son, Ship and Engine Bldg. Co., Philadelphia, Pa.—Automobile castings.

Dietz, R. E. Co., 35 Laight St., New York City.—"Dietz" lamps, oil and gas; also generators.

Dodge Lubricator Co., Columbus Ave., Boston, Mass.—Dodge lubricators and timers. The new timer and the latest model lubricator will be described in our next issue.

Dover Stamping & Mfg. Co., 385 Putnam St., Cambridge, Mass.—Dover gasoline funnels and a drip pan for use beneath cars in garage.

Dow Portable Electric Co., Braintree, Mass.—Dow spark coils, plugs, timers, etc.

Eagle Oil & Supply Co., 104 Broad St., Boston, Mass.—"Eagline" grease and packings.

Eastern Carbon Works, Carbon Place, Jersey City, N. J.—Eastern ignition cells and battery connectors.

Eco Mfg. Co., 43 Columbus Ave., Boston, Mass.—The "Eco" acetylene gas generator.

Electric Rubber Mfg. Co., Rutherford, N. J.—Panther tires.

Electric Storage Battery Co., 60 State St., Boston, Mass.—"Exide" storage and ignition batteries.

Equitable Distributing Co., 24 Columbus Ave., Boston, Mass.—Sundries.

Faulkner-Mills Co., Fourth and Spring Sts., New Bedford, Mass.—Spark coils and spark plugs.

Firestone Tire and Rubber Co., Boston Branch, Park Sq.—Full line of automobile tires.

Fisher & Kuehner, Providence, R. I.—"Providence" automobile engines, to be described in a future issue.

Fuller & Sullivan, 19 Eliot St., Boston, Mass.—Automobile leather garments.

Gabriel Horn & Mfg. Co., Cleveland, Ohio.—The Gabriel chime horn.

Gearless Transmission Co., Rochester, N. Y.—The gearless transmission for automobiles.

Gilbert & Barker Mfg. Co., 51 Union St., Boston, Mass.—Gasoline storage outfits.

Gilbert Mfg. Co., 76 Center St., New Haven, Conn.—The Gilbert tire cases, storm aprons, lamp covers, leggings, etc.

Globe Optical Co., 395 Washington St., Boston, Mass.—Full line of automobile goggles.

Gray & Davis, Amesbury, Mass.—Lamps and generators.

Gray & Sons, Peter, 90 Union St., Boston, Mass.—The "Powerful" search light.

Greenwood, A. N., Oil Co., 71 High St., Boston, Mass.—Oils.

Harris Oil Co., Providence, R. I.—Harris oils and lubricants.

Hartford Suspension Co., 67 Vestry St., New York, N. Y.—The Truffault-Hartford shock absorber.

Harvard Marine & Auto Co., 25 Elliott St., Cambridge, Mass.—Represented by R. M. Kimball—Harvard gasoline automobile engines.

Healey Leather Tire Co., 88 Gold St., New York, N. Y.—Healey leather covered automobile tires.

Heinze Electric Co., Lowell, Mass.—Heinze spark coils.

Hicks Speed Indicator Co., 1384 Bedford Ave., Brooklyn, N. Y.—Hicks speed indicator and odometer.

Hillman Plating Co., 38 Chardon St., Boston, Mass.—Tire brackets and mountings for automobiles.

Hill Motor Car Co., Haverhill, Mass.—"Victory" shock absorber, to be described in a future issue.

Hjorth, Wm., Jamestown, N. Y.—Line of wrenches and pliers.

Hopewell Bros., Cambridge, Mass.—Tire case.

Hodgson, E. F., Dover, Mass.—Portable houses for automobiles and for other uses.

Hutchinson Electric Horn Co., 1 Madison Ave., New York City.—Automobile horns, dry batteries and battery charging switches.

Iron Clad Mfg. Co., Brooklyn, N. Y.—Gasoline storage tanks and shipping barrels.

Iron Tire Pneumatic Wheel Co., 259 Fifth Ave., New York City.—The "Iron Tire" pneumatic wheel for automobiles.

Johnson, Iver, Sporting Goods Co., Boston, Mass.—Automobile sundries.

Jones Speedometer Co., 127 W. 32nd St., New York City.—Jones speedometers.

Kilgore Auto Air Cushion Co., 46 Columbus Ave., Boston, Mass.—Kilgore air cushion shock eliminator, mechanical features of which are described in this issue.

Knowlton, Geo. W., Rubber Co., 88 Broad St., Boston, Mass.—St. John solid cushion rubber tires.

Lloyd, Andrew J. & Co., 315 Washington St., Boston, Mass.—Imported goggles.

Loring, E. J., 76 Highland Ave., Somerville, Mass.—The Loring jar-proof speed gauge.

McGlehan Mfg. Co., New York, N. Y.—McGlehan's combined speedometer, odometer and clock.

McHardy Carburetor Co., 43 Sabin St., Providence, R. I.—Carburetor, to be described in a future issue.

McMillan, Jos. B., Ellicot City, Md.—"Maryland" automobile tops, to be described in a future issue.

Manhattan Storage Battery Co., 42 Cortlandt St., New York, N. Y.—Full line of Majestic automobile lamps and other accessories and sundries.

Melrose Automobile Co., Motor Mart, Boston, Mass.—National kerosene burner and other steam specialties.

Miller, Chas. E., 97 Reade St., New York, N. Y.—Line of automobile and motor boat supplies.

Mitchell Punctureless Pneumatic Tire Co., Swampscott, Mass. — Mitchell punctureless pneumatic automobile tires.

Motor Car Specialty Co., Trenton, N. J.—The Lea "Speedistimeter," a speed, distance and time meter, and the Lea tire pump.

Mullens, W. H. Co., Salem, Mass.—Steel automobile bodies.

Murray, P. A., Washington St., Newton, Mass.—Murray automobile tops.

National Carbon Co.—Showed the Columbia dry cells for ignition purposes.

New England Motor Co., 82 Fletcher St., Lowell, Mass.—Storage and ignition batteries.

Nichols, D. P. & Co., 116 W. Brookline St., Boston, Mass.—Bodies and tops.

Norton Emery Wheel Co., 237 Chandler St., Worcester, Mass.—Crank shafts for automobile engines.

Oil Tempering Spring Co., Chicopee Falls, Mass.—Springs.

Old Colony Light Co., 241 Boylston St., Boston, Mass.—"Puritan" gas tanks, to be described in a future issue.

Pantasote Co., The, 11 Broadway, New York, N. Y.—Pantasote imitation leather for automobile trimmings.

Pennsylvania Rubber Co., Jeanette, Pa.—Pennsylvania automobile tires.

Post & Lester Co., The, Hartford, Conn.—Full line of motor clocks, horns, lamps and other accessories.

Prosser, Thos. & Son, 15 Gold St., New York, N. Y.—Krupp steel for automobile construction.

Randall-Faichney Co., Sudbury Bldg., Boston, Mass.—"B-Line" oil and grease guns for automobile use.

Rands Mfg. Co., Detroit, Mich.—Rands automobile tops.

Robinson, Wm. C. & Son Co., 141 Milk St., Boston, Mass.—Machine and cylinder oils.

Rollins Mfg. Co., 279 Washington St., Boston, Mass.—"The Hoffecker" speed and mile register.

Rose Mfg. Co., 910 Arch St., Philadelphia, Pa.—Full line of "Neverout" lamps, gas producer, etc.

Rubay, Leon, 140 W. 38th St., New York, N. Y.—"Lacoste" ignition apparatus (imported).

Russell, H. J., 32 Exchange St., Worcester, Mass.—New tire case and luggage carrier, to be described in a future issue.

Sage Trunk Depot, 81 Summer St., Boston, Mass.—Automobile trunks.

Salisbury Tire Co., Owosso, Mich.—Salisbury leather tire, described in this issue.

Samson Leather Tire Co., 12 W. 33rd St., New York, N. Y.—Samson leather, non-skidding, puncture-proof automobile tires.

Saunders, C. H., 9 Everett St., Melrose, Mass.—Gray-Hawley Muffler and auto chime made by Gray-Hawley Mfg. Co., Detroit, Mich.

Spear's, The Alden, Sons, 369 Atlantic Ave., Boston, Mass.—Line of lubricants, soaps and polishes.

Sprague Umbrella Co., Norwalk, O.—Sprague automobile tops.

Springfield Moulding Works, Springfield, Mass.—Portable houses for automobiles.

Teel, E. & Co., Medford, Mass.—The Teel tire case; Teel tops.

Tokheim Mfg. Co., 204 Varet St., Brooklyn, N. Y.—Gasoline storage outfits.

Toppan, A. W., 9 Haverhill St., Boston, Mass.—Standard automobiles.

Trident Wheel Co., 84 State St., Boston, Mass.—Wheels.

Uncas Specialty Co., 37 Shipping St., Norwich, Conn.—Timers and distributors.

Underhay Oil Co., 73 Batterymarch St., Boston, Mass.—Oils.

Vacuum Oil Co., 101 Milk St., Boston, Mass.—Line of oils for automobile use.

Veeder Mfg. Co., Hartford, Conn.—Odometers, tachometers and tachodometers.

Vehicle Equipment Co., Long Island City, N. Y.—Electric commercial trucks.

Voorhees Rubber Co., Jersey City, N. J.—Voorhees solid tires for automobiles.

Wells Light Mfg. Co., 44 Washington St., New York.—Anti-skid tire bands and retreading covers.

Way Muffler Co., 23rd and Arch Sts., Philadelphia, Pa.—"Way" throat, chest and ear mufflers.

Whitney, C. F., 43 Columbus Ave., Boston, Mass.—Full line of National sparking and vehicle batteries made by National Battery Co., Buffalo, N. Y., and the Buxton hampers and baskets made by B. W. Buxton, Springfield, Mass.

Whitney Mfg. Co., Hartford, Conn.—"Whitney" automobile detachable chains.

MISCELLANEOUS.

Consolidated Mfg. Co., Toledo, Ohio.—Yale-California motorcycle and Hussey handle bars.

Crouch Motor Co., Stoneham, Mass.—Crouch motorcycle.

Hendee Mfg. Co., Springfield, Mass.—Indian motorcycles and delivery cars.

Jacobs Mfg. Co., 172 Pearl St., Hartford, Conn.—Jacobs improved drill chucks.

Olds Gasoline Engine Works, Boston Branch, 69 Washington Ave.—Olds stationary engines.

Smith, Ben., 319 Columbus Ave., Boston, Mass.—"Merkel" motorcycles made by Merkel Motor Co., Layton Park, Wilwaukee, Wis.

MOTOR BOATS, MARINE ENGINES, ETC.

Atlantic Co., The, Amesbury, Mass.—Motor boats.

Automatic Machine Co., Bridgeport, Conn.—Gasoline marine engines.

Baker, Yacht Basin, Inc., Quincy, Mass.—Motor boats.

Binney, Arthur F., 70 Kilby St., Boston, Mass.—Naval architect.

Buffalo Gasoline Motor Co., P. O. Sq. Bldg., Boston, Mass.—Gasoline marine engines.

Briggs & Wade, 76 Sagamore St., Lynn, Mass.—The Sagamore Standard and special gasoline engines.

Brown-Talbot Machine Co., 438 Old South Bldg., Boston, Mass.—Marine motors and motor boats.

Burgess, Hollis, 10 Tremont St., Boston, Mass.—"Mohler & Degress" marine engines made by F. A. Seitz & Co., of Newark, N. J., and "Trebort" marine engines made by Brownell-Trebert Co., of Syracuse, N. Y.

Camden Anchor-Rockland Machine Co., Rockland, Me.—Knox gasoline marine engines and motor boats.

Coleman, Walter, Sons, 300 Water St., Providence, R. I.—Marine engines.

Cooley Mfg. Co., 146 Franklin St., Boston, Mass.—Marine engines.

Detroit Boat Co., Detroit, Mich.—Line of motor boats.

Emery, V. J., Wollaston, Mass.—"Ideal" gasoline engines.

Emmons, E. Gerry, Corporation, 33 Haverhill St., Boston, Mass.—Motor boats and marine motors.

Essex Engine Co., Lynn, Mass.—Essex gasoline engines.

Fairbanks Co., The, 42 Pearl St., Boston, Mass.—Marine engines (gasoline).

Fisher & Kuehner, Providence, R. I.—"Providence" marine engines, to be described in a future issue.

Fuller & Sullivan, 19 Elliot St., Boston, Mass.—Adams marine transmission.

Gearless Transmission Co., Rochester, N. Y.—The Gearless reversing and transmission device for motor boats.

Goodwin Bros., Riverside Ave., Medford, Mass.—Line of motor boats, including the power dory "Swampscott," also marine motors.

Gulliford, Geo. A., 303 Eastern Ave., Lynn, Mass.—Motor boats.

Hall Gasoline Engine Co., Wollaston, Mass.—Hall gasoline engines.

Hasbrouck Motor Co., New London, Conn.—Marine motors.

Harvard Marine & Auto Co., 25 Elliot St., Cambridge, Mass.—Gasoline marine engines.

Johnson, Carlyle, Machine Co., Hartford, Conn.—Johnson reversing clutch for motor boats.

Lamb Boat & Engine Co., Clinton, Iowa.—Motor boats and marine engines.

McFarland Foundry & Machine Works, Trenton, N. J.—Harthan propeller wheels.

McClellan, Chas. P., Fall River, Mass.—Automobile tops, launch tops and spray hoods.

Michigan Steel Boat Co., Detroit, Mich.—Line of motor boats.

Monitor Electric Speed Recorder Co., The, Cambridge, Mass.—Speed recorder for boats, to be described in our next issue.

Morss, A. S. Co., 210 Commercial St., Boston, Mass.—"Eagle" engines and motor boat supplies.

Mullins, W. H. Co., Salem, Ohio.—Steel boat hulls and motor boats.

Murray & Tregurtha Co., S. Boston, Mass.—Marine motors.

Norfolk Motor Co., Wollaston, Mass.—Gasoline marine engines.

Palmer Bros., 85 Union St., Boston, Mass.—Gasoline marine engines.

Perkins Launch & Motor Co., 81 E. Main St., Gloucester, Mass.—Showed a line of motor boats.

Puritan Engine Co., 382 Atlantic Ave., Boston, Mass.—"Puritan" marine engines, to be described in a future issue.

Rice, J. V. Jr., Co., Bordentown, N. J.—Marine motors.

Richardson Engineering Co., 36 Pearl St., Hartford, Conn.—The "Rich" spark plug and the Richardson boat lighting outfit.

Smith, Benj., 319 Columbus Ave., Boston, Mass.—Hubbard gasoline marine engines made by Hubbard Motor Co., of Middletown, Conn.

Swasey, Raymond & Page, 621 Colonial Bldg., Boston, Mass.—Naval architects.

Toppan Boat Mfg. Co., 9 Haverhill St., Boston, Mass.—Motor boats.

Tuttle, D. M. & Co., Canastota, N. Y.—Tuttle spark plug protector and marine motors, motor boats, etc.

Waltham Boat & Canoe Co., Waltham, Mass.—Line of motor boats.

Wells, A. E. & Sons, 53 Puritan Rd., Swampscott, Mass.—Motor boats.

Considerations of Motor Car Elements

HUGH DOLNAR.

(Under the above heading the Journal will print a series of articles, treating of motor car details considered in the lights of both practice and forecast. The name of the writer is well known to our readers as a describer of new cars, and his extended experience as a machine designer and constructor gives value to the deductions and original suggestions presented in these "Considerations," which will cover the principal details of motor car construction. Should any of our readers dissent from the conclusions reached in these articles, the columns of the Journal are open to all, in the full belief that free discussion and interchange of opinion is the shortest road to perfection.—Editor.)

The Chassis Frame and Springs

The first motor cars, steam driven, 1830 or so, had in some instances a chassis frame not very different in form from those of today. When the Benz cars, which were about the first of the gas engine driven vehicles to come into much use, appeared, the machinery was carried on the body frame largely, and the placing of principal parts had nothing artistic about it. There are yet a few cars which fasten the machinery or part of it, to the car-body, but it may be assumed that this will not be permanent practice, and that the body will be wholly separated from all working parts of the cars, which will be fixed to and supported by either the axles or the chassis frame exclusively.

The obvious and logical arrangement of motor car elements is to make a nominally rigid unit of the entire propulsion system framing and rear axle, reaching forward to the front axle, this one piece of framing taking the motor, speed-change, transmission and driving axles and wheels, or stationary rear axle and driving wheels, in case the rear wheels only are driven. The front wheel drive has many points of advantage, but it does not bid fair to be a principal type, and the same is true of the "fore-carriage," a detachable propulsion assemblage, capable of being removed from one vehicle and applied to another, to meet varying service demands.

The 4-wheel drive has not yet taken the place in practice that its theoretical superiority seems to deserve; the 4-wheel drive makes each wheel of the car the same propulsion element, and so demands a totally different construction from the two driven wheel car which is now the almost exclusive type.

It may be said, then, that present interest centers in the best form of car frame to support the car-body, take the top spring-support and serve as a principal connecting member between the rear and front axles and wheels.

It is quite certain that great numbers of cars will be built having front guiding wheels, rear driving wheels, motors in front, change gear front, rear, or intermediately placed, in which the principal supporting element will be a chassis frame which will carry the body and serve as a connecting and supporting member for the entire carrying and driving assemblage of the vehicle.

Of what material should the sides of this frame be constructed and what form should this frame take?

This elementary chassis frame must have two side members, and these side members may be greatly diversified forms, varying from steel tubing assemblages, like two bicycle frames, to long springs reaching from the front to rear axle, or to the present pressed steel or angle steel chassis frames.

It is not at all certain that two long side springs somewhat as used in the original Oldsmobile, and other light cars, or the reversed full-elliptic long side-springs, as used in the 1905-6 "Monarch" do not show the best possible connecting and supporting members which can be used to connect the front and rear axles of a light car, but, for the moment, any use of full length side springs as chassis frame side members will be passed without consideration, and attention will be given to the more or less flexible rectangular steel plate or angle steel structure commonly spoken of as the chassis frame.

The sides of the ordinary chassis frame have been constructed in four principal forms, known as the armored wood, the built up angle steel, the integral angle steel and the now fashionable pressed steel frame-side.

The armored wood, and the light angle-steel wood-reinforced frame-sides, are stiff and strong for their weight and lend themselves readily to various methods of part fixing in which advantage is taken of the elasticity of the wood to obtain various effects. This composite steel and wood frame side need not be considered at much length, as it has disadvantages, well known, which cannot be obviated, and although so good 1906 cars are using an armored wood frame side, it seems impossible that any composite member of this kind can continue in favor. A wooden reinforce stiffens a light angle steel girder greatly, and makes a stiff and strong member at small cost, but wood is an uncertain structural element, and all uncertainties are sure to be finally avoided in motor car construction.

The all steel built up frame side, in which a flat vertical member has an angle steel member applied by riveting, has been largely used, has nothing to recommend it over an integral steel side of the same section, and may be passed as obsolete without consideration.

The plain angle steel chassis frame side has been and is very largely used, and has, perhaps, fewer faults and more advantages than any other chassis frame structural element. It is cheap, is strong for its weight, is stiff, and gives good surfaces for fixing of applied parts. Angle steel is used in some of the best car chassis frames, and though the pressed steel frame is the leading 1906 fashion, careful analysis fails to show any marked superiority of the pressed steel frame over that formed up from the angle steel bar.

Assuming, then, that the simple angle steel bar is one of the best structural elements for the frame, what should be the disposition of the angle members, and what should be the form and construction of the frame?

Vertical stiffness of this body supporting frame is the first requirement, and this indicates the vertical placing of the wider angle-steel member, and as the vertical member must retain the body, the weight of practice is in favor of placing the vertical member inside and the horizontal member underneath.

Should the frame sides be parallel, or wide at rear and narrow in front?

The better appearance is obtained with the narrow hood, and room for the wide tonneau seat, detachable or built in, demands the wide rear. If the difference in end widths is had by OG curves in the sides, the frame is greatly weakened vertically and complications in plan of supported members are introduced. To avoid these undesirable features, make the rear angles slightly acute, and so make the sides approach each other as they go forward, bringing them to the desired narrow width, in front. This is the form shown in the 1906 Austin car, which is large, and this form seems equally well adapted for all smaller sizes of cars.

The obvious construction is to make the frame of a single angle steel bar, bent at two places to obtain the rear width, the sides reaching forward to the open front end.

Returning now to the long reversed elliptic springs, reaching from one axle to the other, make the lower spring members parallel, but perch the top members obliquely on the bottom members, so as to bring the top spring members directly under the frame sides when the lower spring members connect the two axles by rigid perching in front, and revoluble perching on the rear axle.

For the propulsion frame, fix the open ends of a loop of angle steel to the rear axle, making this loop long enough to reach a full elliptic cross-spring, perched on the front axle.

Fasten the chassis frame to the ends of the side spring top members, rigidly in the rear, sliding in front.

It is to be particularly noted that the diagonal superimposing of the top reversed full elliptic spring member on the bottom member, which is new to the writer, obtains several advantageous effects. The lower spring members are parallel, the perching on the axle is all at right angles, and the paying load is carried as far outside as the front axle construction permits, and if the propulsion assemblage frame is supported on a half elliptic spring, the motor-weight may be taken on the front axle spring perches, also as far out as possible, leaving the front axle with no mid-load, while the top spring ends pass the bottom perching, rear outside and front inside, with no overhang and no twist on the lower spring member.

This gives as follows: (a) A light, low-cost construction; (b) a full 3-point transmission frame and rear axle assemblage, avoiding flexible shafting; (c) a paying-load mid-support on very long reversed half-elliptic side springs, which carries the load with the least possible rise and fall for given road-face rise and fall; (d) a body support subjected to greatly reduced twisting stresses from unequal road side level variations. Perhaps 80 ins. will be found the extreme wheel base practicable.

It is not now certain that this assemblage as here defined can be excelled for low weight, low cost, small propulsive effect requirement, easy carriage and general suitability for small and medium sized cars.

SPRING LENGTH.

The full length half-elliptic springs, or reversed full elliptic springs form front and rear axle connectives which have many advantages and few faults up to certain lengths of wheel bases, from 54 ins. upward, 78 ins. being at one time thought a good length. Now Hansen, of the 4-wheel Drive Wagon Co., has touring cars of 128 ins. wheel base, Packard 118 ins., and there seems to be no limit to the wheel base, because with half elliptic springs every added inch of wheel base makes perceptibly easier riding, simply because it reduces the car body fore and aft angle imparted by a given road surface variation.

Three point support greatly diminishes the front and rear and crosswise body angles for road surface irregularities, and it seems not unlikely that there may be a return to shorter wheel bases—when 3-point or approximate 3-point support comes to be commonly appreciated.

Returning to the full length side springs, half or reversed full elliptics, 80 ins. seems to the writer to be as long as it is desirable to make this form of spring, though in the absence of practice it is not certain that the full length side spring needed to give 100 ins. wheel base is bad.

Obviously springs should be as short as may be to gain stability and convenience of construction, and in 1895 the "Electrobat" was shown with coiled springs. The coiled spring cannot be made to give anything at all like the effect of flat or slightly curved spring members, and though often tried has always been abandoned.

Elliptic and half elliptics from 30 to 52 ins. long are now fitted to cars, and 4 short full elliptic springs have been fitted at first triel which gave excellent results under a small touring car body.

Very long half elliptics from one axle to the other have had a wooden middle part, with a steel leaf assemblage aplied to either end, but wood is undesirable in any part of a motor car, and such a composite spring cannot be accepted as safe.

Perhaps from 30 to 40 ins. may be assumed as desirable spring member lengths, and these are altogether too short for full-length side springs, so that some other construction must be found for even the shortest runabout, if the most advantageous spring length is to be adopted. This makes the chassis frame side a functional member of the propulsion system.

SPRING SHAPES AND WIDTHS.

Clark linked 3 half elliptic members together end wise to gain a long side spring effect with comparatively short individual spring members, and the platform springs are made to give a very easy support by linking half elliptics which cross each other.

The scroll-head spring in which half elliptics of different lengths are linked by returning the end curves of the longer member are regarded with great favor, and give very easy riding, which is said to be partly, at least, due to the difference in effective lengths of the spring members.

The C-spring, which is the final resort for easy carriage of the horse drawn vehicle constructors, has never yet been applied to the motor car so far as the writer is informed.

From all that has been shown up to the present time it seems that the springs most likely to be retained by the motor car constructors are half-elliptics, either simple or compounded into full elliptics or platform varieties, the compounds giving vastly the better effects.

There is a very pronounced inclination at the beginning of 1906 to increase the width of elliptic spring leaves from 1¾ to 2 or even 2¼ ins., and generally speaking the wide thin spring leaf is more elastic for a given weight and hence is the better carrier, and consequently the least liable to fracture.

There have been many costly experiments made by car builders with elliptic springs, few of which have been made subjects of record, and none of which have ever been tabulated or compared and published in such form as to be studied to any advantage. Practical spring makers are ready to furnish springs of any length and any number of leaves to carry any specified weights, and the invariable procedure is to fit a set of springs to a new car by guess, length, opening, width, weight supported and form of head being the only specifications given to the spring makers, who determine the leaf thickness. Ribbed spring leaves are less elastic than those lipped for sidewise retention, and banding springs makes them less rapid in yielding and recovery by increase of leaf friction, and lipping and banding are regarded as good 1906 practice in motor car springs.

Half elliptic, full elliptic button head, full elliptic scroll head and platform springs are the forms most likely to continue in favor for motor cars, and it is worth while to here briefly note the supporting effects due to various semi-elliptic spring combinations and placings, as this seems to be the most that can be done to assist the builder, because each car appears to demand springs peculiar to itself, and the most experienced constructors depend on trial alone for final spring determination.

THREE HALF ELLIPTICS.

Two half elliptics on the rear axle, lengthwise of the car, and one half elliptic on the front axle crosswise of the car, give an approximate 3-point support with rigid spring perching. This is the simplest and most obvious form of motor car springing, and in the writer's opinion the abandonment of the front cross spring for 1906 by some makers of note, is much more than offset by the placing of the cross half elliptic in front by Gulick in his 1905 Simplex, one of the most advanced examples of American car design.

FIVE ELLIPTIC HALVES.

Five half-elliptic spring members disposed as two lengthwise rear full elliptics and one front cross half-elliptic seems an excellent arrangement, especially with scroll heads for the full springs. In all cases added spring width and reduced and graded spring thickness make surprising differences in the way of softness and easy riding and in closing and recovery time. Whether any rules capable of general application are ever formulated or not, the constructor will probably always make many trials before he is contented with his springing, and no one knows yet how wide and thin springs may be made to advantage. Side lips appear to be right, and ribbing the leaves seems to be wrong. Banding can be made to greatly change spring action.

FOUR FULL ELLIPTICS.

Some of the best riding 1906 cars are on four full elliptic springs, and the makers of these cars are not at all slow to express the conviction that the full elliptic is the only thing that should ever be placed under a chassis frame, and point to the constant travel up and down of the front spring joints as visible evidence of tire wear reduction and body rise and fall avoidance.

"FRENCH" OR THREE-QUARTER PLATFORM REAR SPRINGS.

This form of spring, two lengthwise half elliptics on the rear axle jointed to rear side frame hangers, and carrying a cross half-elliptic forward, perched under the middle of a chassis frame cross member, is used in some extremely well designed cars. This arrangement gives three points of spring support under the tonneau, making the rear seat riding much easier than with two half-elliptics only, and also very much reducing the twisting stresses on the car body. This is the plan used by the St. Louis designers who have had long experience, and also by the Rapid delivery cars.

FULL PLATFORM REAR, FULL ELLIPTICS FRONT.

This is an arrangement which may have been tried, but has never been seen by the writer, and which seems to be worthy of careful consideration.

Suppose the propulsion frame, nominally rigid with the rear axle, as before mentioned, and as seen in the "Simplex," is carried at the front end by a cross half-elliptic on the front axle, and that the front end of the chassis frame is on two full elliptics perched on the front axle, while the rear of the chassis frame is supported in the mid-line by the front and rear cross half-elliptics of the rear full platform spring, fixed or revoluble perching.

This arrangement gives entirely separated 3-point supports for the propulsion and paying load systems, and gives full elliptic support to the body at four points. It is to be noted that the vertical movement of the full elliptic is made in half the time of the half-elliptic, bar friction showing, and hence should make springs carry their load smoothly over a certain road at twice the speed of half-elliptics, same load and road.

With sufficient leaf width and elasticity, it seems that this should make a most excellent spring support for high speeds.

Too much consideration cannot be given to the double rapidity of spring vertical action, gained by the full elliptic as compared with the half-elliptic spring.

If a spring were unvarying in tension or load carrying capacity, and acted through its full range in no time, then road level variations up to the limit of spring range would not move the spring supported body vertically, hence whatever quickness the spring action extends the speed limit on a road of certain level variations, and whatever slows the spring vertical movements reduces the speed limit on the same road.

Hence the greater the spring range and the quicker the spring action, the higher the car speed limit on a given road, or, for a given speed, the greater the road level variations required to produce given fluctuations in road level.

If this is true, and it seems to be indisputable, then spring closing and body tossing are both due not to quick spring action, but to slowness of spring action which makes the wheels fail to follow the road surface contour, and so lets the load drop on the depressed spring and cause spring closing by momentum gained by the fall, and tosses the body by the blow which road rise delivers to the not sufficiently elastic spring.

This conclusion is not inconsistent with spring check relief, which slows the all ready too slow spring action. In dropping into a hollow the spring check slows the body fall so that it does not drop so far in a given time as it would without the check, and the rise does not toss the body on the return so much as if the body had made a greater descent, while the spring check still more reduces the body lift by slowing the spring action.

If all this is true, then the better remedy for spring closing and tossing is to quicken the springs by doubling to full elliptics and widening and thinning the spring leaves, instead of making the spring sluggish by spring checks and banding.

The writer makes no pretension to experimental knowledge of car springing, and will be glad to be set right if the foregoing conclusions can be shown to be erroneous.

SPRINGS.

Without question, the motor-car is farther astray in the matter of springs than in any other one particular.

Springs have been wrong ever since cars began to go fast, and so far no one has been able to put a set of springs under a car that gives any approach to the smoothness of translation reached by the best horse-drawn carriages.

The motor car touneau seats never ride so well as the front seats.

Marmon, Gulick, The Adams and Farwell, and probably many others show things that can be done towards separating the passenger-carrying part of the car from the chassis, so that the car-body is, in such cars, on even terms with the horse-drawn carriage body as to weight, and is unaffected by the action of the propulsion system, and in this ultimate condition the car body can certainly be placed on springs that will give as smooth transportation as the best of horse-drawn carriages, and with 4-inch pneumatics under the chassis the motor car should be the easier since solid rubber tires are the best that horse-drawn vehicles use, if the automobile is held down to horse pace, or even up to say 20 miles on fair roads.

Taking the ordinary case, where everything above the axles is carried on the springs, the battle of the half-elliptics against the full elliptics is on.

The general opinion at the end of 1904 was favorable to the half-elliptic. The end of 1905 shows stubborn advocates of the full elliptics, who not only have the weight of the argument on their side, but can show cars of all weights except the very heaviest on four full elliptics that give as easy translation as any motor cars, and fully prove the possibility of carrying any car-body on full elliptics without the aid of spring checks or "shock-absorbers" easily and well.

The full elliptic is more, much more, than twice as good a shock prevention as the half elliptic same length and load-carrying capacity. The "Oxford" placed a set of short full elliptics at the first trial which were as good in action as any observed by the writer. The "Premier" and "Marion" full elliptics were the result of many trials, and the "Marion" held back nothing in the factory save the graded thickness of the spring leaves, which had been obtained only after a very costly series of experiments. The Marion is one of the very best 1906 cars observed by the writer so far as springing goes, and the Oxford, Premier and Marion were great surprises to that individual, who had been told so many times by so many past masters of American motor car construction that the full elliptic must toss the passengers sky high if run fast, that he fully believed the story.

But a moment's consideration will show that no single spring, no matter what its shape, can correctly handle a car at all speeds on rough roads. Up to 10 or 12 miles a set of springs can be fitted that will make the car ride easily, and up to 20 miles unaided springs can do very well on moderately rough roads, though there will be some spring closing and some tossing unless the driving is better than common.

Over 20 miles, the single spring of any known form fails to meet the requirements. If flexible enough to give good riding on fair roads at moderate speeds the springs will close with rough surface and faster pace, and the endless task of changing springs and trying them out and changing again begins, and continues, not until the builder is satisfied with the result of his labors, but until he can wait no longer about placing his spring order, and so picks out the best set of the lot of failures and says they are good enough. Probably not one single exhibitor at the 1906 shows could truly say he was satisfied with the springs under his car bodies.

What is wanted is something which is ideal both in construction and action, durable and costing little, that will leave the springs absolutely free to yield at the normal level, and will prevent metal to metal spring closing and also hinder quick spring recovery to the extent of wholly preventing tossing.

The writer does not believe that anything like ideal springing can be had with any form unaided springs, good, surprisingly good, as some of the 1906 full elliptics are. To meet all requirements the spring effect must automatically make enormous differences in its resistance and recovery effect, and must be helped by a powerful auxiliary, whose services will be called into action by the road level variation impact in the precise degree demanded by the special instance.

Such an auxiliary is a difficult production, but when once shown and known it must come into general use, as purchasers will not buy hard riding cars if easy ones can be had.

Atlantic City Races

The first automobile race meet of the season in the East will be held at Atlantic City on April 26, 27 and 28. During the three days tournament there will be eighteen races decided over the beach course and the programme affords an opportunity for almost every type of car. The meet will be held under the auspices of the Atlantic City Automobile Club, and a very large number of entries are looked for.

There will be races for gasoline cars of various weights and for steamers; a race for touring cars of 40 horse-power or less for the amateurs, and four touring car contests under price classifications from $4,000 to $1,500. There will be a price handicap for four-cylinder touring cars and another one for two-cylinder cars. In addition there is scheduled a handicap for cars that travel the beach at better than a mile a minute, a race for air-cooled cars and one for machines of six cylinders. All speed contests will be decided at one mile.

The Indianapolis automobile dealers and manufacturers will hold a hill climbing contest on May 12, at Michigan Hill.

Jacksonville (Fla.) Automobile and Motor Club have selected April 9, 10, 11, and 12 as the dates for their race meet on the Atlantic-Pablo beach, near Jacksonville, and Senator Morgan is endeavoring to arrange a series of races between the Stanley Steamer and Alfred G. Vanderbilt's 250 H. P. racer as the star attraction.

There is considerable dissatisfaction in New York City and Boston over the proposal to start the Glidden Trophy Tour from Buffalo on July 9th, and there is a movement on foot to inaugurate a rival tour starting from New York on July 16th, with Portland, Me., as the objective point and the finish at Boston on July 28, taking in the White Mountains on the way.

The E. R. Thomas Motor Co., Buffalo, N. Y., are building three high power racing cars to compete for the Vanderbilt cup this year. A driver has been engaged and no expense is being spared in constructing these cars for the sole purpose of winning the cup. E. R. Thomas states that losing the race will cost him $40,000, and if his car wins the driver gets $25,000 more. He urges the A. A. A. to appoint on the Cup Commission no one interested in the manufacture or sale of motor cars.

THOS. B. JEFF
& C
Rambler
W. W. GAWTHROP. AUTO

FINISH OF AN 18,450 MILE TRIP.

C. M. Huston and his son Louis, of Chicago, in the Rambler car, have finished what is perhaps the most remarkable trip ever made, the distance covered being 18,450 miles. Leaving Chicago on April 5, 1905, they traveled through Ohio, Indiana, Michigan, New York, Pennsylvania and New Jersey, arriving at Atlantic City, where they stopped seven weeks. They then traveled through Virginia, the Carolinas and Georgia to Jacksonville, Florida, arriving there early in October. They then proceeded to Atlantic Beach, St. Augustine, Ormond, Cocoa and Daytona. Between St. Augustine and Daytona the Hustons had to lay 1,000 feet of planking to form a solid roadbed. Two years ago at this point Lieut. H. L. Willoughby had to use sand anchors to extricate his machine from the sand and then had to return to St. Augustine.

Two-Cycle Gas Engine Patents

HUGH DOLNAR.

There are at this time a large number of motor-car designers busying themselves with the two-cycle motor, very few of whom are aware of what has been patented in that line. Parker & Burton, Patent Lawyers, Detroit, have given the writer access to their library, and a few of the patents on two-cycle gas engines which seem to be of the greatest present importance to experimenters, are briefly noticed in the following article.

The two-cycle gas engine in its best forms can do more than twice the work done by the four-cycle motor, same piston diameter, stroke and revolutions per minute, and the two-cycle cylinder, although making twice as many working strokes per minute as the four-cycle motor, same crank shaft turns per minute, is the more easily cooled, and hence better for air cooling. The two-cycle motor need not have any valves at all, need not be any higher for a given stroke than the four-cycle, though it often is, and can be readily made to reverse, if desired, and can also be readily made self-starting. The two-cycle motor should give as much or more power for two cylinders as the four-cycle for four cylinders the same bore and stroke, and the two-cycle does not need the cam shaft, cams, valve lifters nor valves, and if air-cooled does not need the water pump, water jackets, water connections nor radiator. The air-cooled two-cycle may need the fan, though large four-cycle air-cooled motors work well without the fan. The late forms of four-cycle four-cylinder motor, cylinders 4½ to 5 in. bore, pistons say 5 in. stroke, do not weigh much under 550 pounds all told, and the radiator and water add nearly 100 pounds more, a two-cylinder two-cycle motor, cylinder 5 in. bore, pistons 5 in. stroke, can probably be made to weigh less than 350 pounds, to give the same crank shaft torque and the same brake horse power as the four-cycle four-cylinder motor of about twice the weight.

All of these possibilities give the two-cycle motor great interest to the motor car constructor, and although what follows makes no pretense to giving a complete survey of the American two-cycle patents, it will greatly aid many experimenters who are working wholly in the dark as to what has gone before.

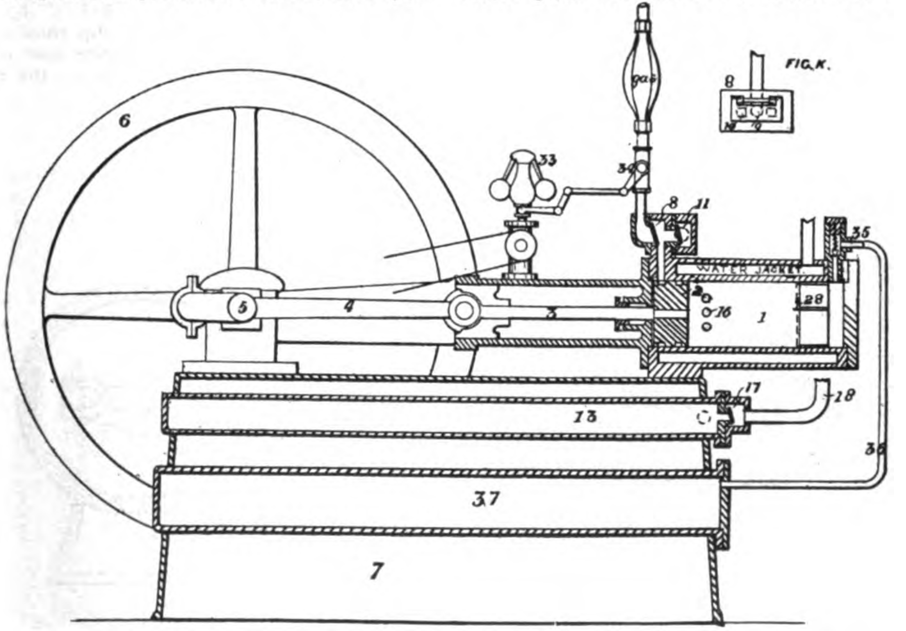


Fig. 1. J. Robson, Am. patent No. 243,795, July 5, 1881. Single acting, front end of cylinder used to compress charge. Mentions starting by exhaust pressure stored in a reservoir.

1. Water-cooled cylinder.
2. Piston.
3. Piston rod.
4. Connecting rod.
5. Crank and shaft.
6. Flywheel.
opens during exhaust
7. Engine base.
stroke.
8. Charge intake flap valve;
9-10. Gas and air ports in piston working stroke
11. Lift valve port, which charge is forced by the combustible charge, 8
8, see Fig. K.
into Reservoir 13.
13. Compressed charge reservoir.
14. Exhaust valve, not shown.
15. Exhaust eccentric, not shown.
16. Exhaust port.
17. Automatic admission from 13 to cylinder.

Robson used a flame ignition. This is given as an early example of using the front end of the cylinder to compress mixture into a reservoir, ready to rush into the cylinder through 17 as soon as cylinder pressure is sufficiently reduced by the exhaust. The closed front end of the single acting cylinder has been often used for a supply cylinder since Robson.

SUCTION STROKE.

The two-cycle vertical cylinder motor makes two strokes only to complete its cycle or circle of piston functions, as follows: Beginning with charge ignition the piston makes one downward working stroke, in which three events occur after the lighting of the charge: (1) The burning charge pushes the piston downward in its working stroke; (2) when the piston is near the bottom end of its working stroke the piston opens the cylinder exhaust port and permits the cylinder contents, flame of burning gas, to escape, which instantly extinguishes the flame which fills the cylinder during the working stroke; (3) the intake port is opened by a yet farther downward movement of the piston, so that at the end of the piston working stroke the exhaust port has opened, most of the burning charge has escaped, or all of it, and combustible mixture under pressure has rushed into the cylinder through the cylinder intake port, which is wide open to the reservoir of compressed mixture when the piston stands in extreme low position at the end of its working stroke. Next (4) the two-cycle piston begins its second, or upward, stroke by first closing the intake port, next closing the exhaust port, and finally, as the piston ascends to the top end of its stroke, it compresses the charge ready to be fired at the commencement of the working downward piston stroke.

form of the two-cycle motor has no separate valves, the piston itself serving as intake and exhaust valves.

THE SUPPLY CYLINDER.

No example in practice of a rotary compressor applied to the two-cycle motor is known to the writer. The compressors used are always pistons and cylinders. The first gas engines were two-cycle, that is, made alternate working and exhaust strokes, and had piston and cylinder charge compressors, and such gas engines have been made in a vast number of highly ingenious forms, some of which are now in the highest favor.

CRANK BOX PRESSURE.

Obviously, if the idle or unfired end of the two-cycle cylinder is sufficiently extended it may be made to include the connecting rod and crank, and may compress the succeeding cylinder charge in this "crank box" by the working stroke of the piston and thus avoid the necessity of a separate compressor cylinder and piston and means to drive the compressor piston. This crank box pressure supplied two-cycle cylinder and piston is the simplest form of heat motor known, and is very largely used for small boats, and has been successfully applied to motor-wagon driving.

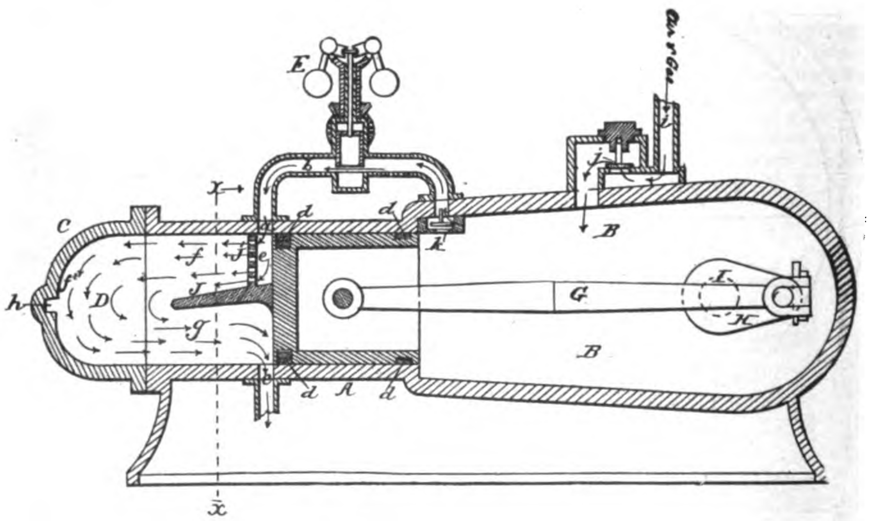


Fig. 2. L. H. Nash Am. patent 386,211, July 17, 1888.

A, Cylinder and crank box.
E, Governor controlling
J, Deflector.
c, Exhaust port.
f, Cylinder space.
i, Crank box intake.
prevents the piston

B, Crank box space.
throttle.
I, Crank shaft.
d, d, Piston packing rings.
g, Cylinder space, exhaust
j, Automatic crank box in-
from sucking side pipe

C, Cylinder head.
G, Connecting rod.
a, Intake port.
e, Perforated plate, integral
side.
take valve.
b.

D, Compression space.
H, Crank.
b, Side pipe.
with the deflector.
h, Clearance.
k, Automatic check valve;

The radical distinction or difference between the two-cycle and the four-cycle motor is, that the four-cycle motor has a suction stroke and can suck the charge into the cylinder, while the two-cycle motor has no suction stroke, hence cannot suck the charge into the cylinder, and therefore the charge must be forced into the cylinder, either before compression or during the burning of the compressed charge.

In the form of motor here indicated by the symbol "two-cycle," the charge under compression in a reservoir outside of the cylinder, rushes into the cylinder as soon as the piston opens communication between the cylinder and the outside compressed charge.

The common form of the four-cycle motor has a piston and two valves; the common

THE FIRST AMERICAN GAS ENGINES.

Unfortunately, illustratons of the first patented American gas engine are not now available. They are, however, in course of preparation, and will be given later, although the actual forms of early gas engines are so far away from present practice as to make them matters of no very great importance to designers. The subject-matter and ground covered by these early gas engines is of very great interest.

The very first American gas engine patent, No. 3597, to Stuart Perry, of Newport, N. Y., was based on a two-cycle air-cooled motor with a supply cylinder, patented May 25, 1844. For this motor fuel Perry first specifies the vapor of spirits of turpentine or vapor distilled from rosin, or carbureted hydrogen gas, naphtha being mentioned as a fuel later in his specification.

Perry says in the specification of his first patent that there have been attempts in the cylinder-fired motor way before his, but none successful, and that he fully believes his motor is more economical of fuel than a steam engine.

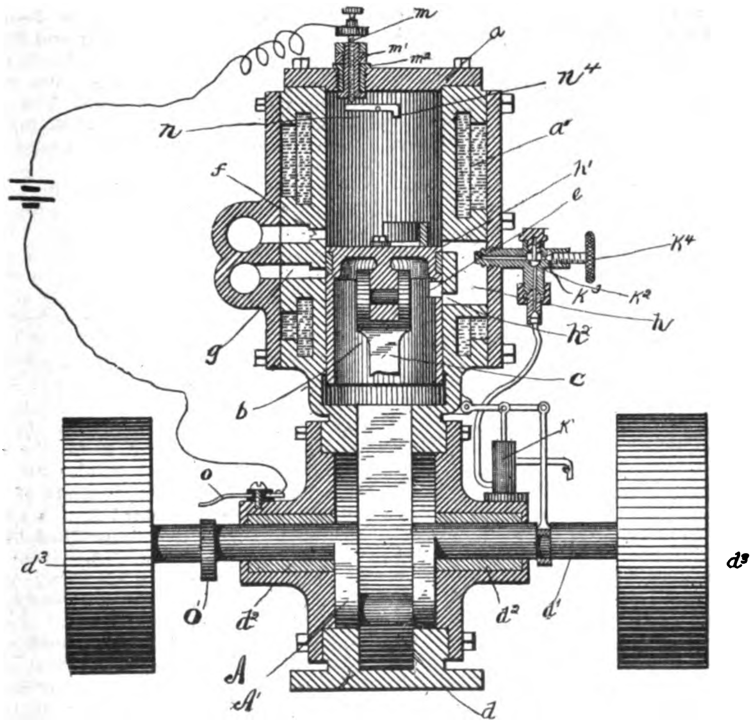


Fig. 3. Clark Sintz, Am. patent No. 509,255, November 21, 1893, two-cycle gas engine, mid-section, vertical, lengthwise.

a, Cylinder.
d1, Crank shaft.
f, Exhaust port.
tice; open air to crank
ordinary practice, from
(This is the cylinder
in piston, to crank
box.)
k1. Gasoline pump. (Shown
k4. Overflow and screw
h2. Indirect supply port.

b, Piston, bottom of stroke.
d2, Bearings.
g, Supply port (from car-
box. Sintz patent).
crank box to intake
intake port.)
box.)
j. Deflector.
as eccentric driven.)
valve.

c, Connecting rod.
d3, Fly wheels.
buretor to crank box,
h, "Chamber." (This is the
port.)
h2. Indirect supply port.
A. Engine base.
k. Gasoline supply valve.
k2. Check valve.
g. Supply port.

d, Crank.
e, Port in piston.
ordinary present prac-
by pass or side pipe,
h1. "Direct supply port."
(Open through port, e,
A1. "Chamber." (In crank
(Not marked.)
k3. Gasoline overflow.
h1. Direct supply port.

The drawing and description of the gasoline supply seem faulty. Common practice would make the needle valve, k4, regulate the fuel supply to the motor; as shown, the total non-adjustable pump stroke discharge of gasoline must go to the cylinder, or else the fuel pumped must be allowed to go to waste through the needle valve k4. Sintz compresses pure air in the crank box, and admits the gasoline fuel just before the compressed air rushes into the cylinder, carrying the gasoline charge with it. This the practice of the Secor 4-cycle kerosene motor, which sucks uncompressed air into the cylinder and draws the fluid kerosene, unvaporized, along with it. The exhaust of the Secor kerosene motor is invisible and odorless. Sintz chooses the short passage h with the piston port e, to the now ordinary long side pipe or by pass, marked Lx in the Cock patent illustration. It may be of interest to note that Sintz patented a heavy compression supply cylinder gas engine, Patent 339,225, April 6, 1886, thus reversing the course of Nash, who went from the heavy pressure cylinder supply to crank box supply, and that Sintz followed this with another attempt with heavy pressure, Patent No. 383,775, May 29, 1888.

Perry's motor was not only two-cycle, but was double acting, same as an ordinary single cylinder steam engine, taking a charge at each end from the supply cylinder. The pressure in the supply cylinder was but little above atmosphere, and Perry's method of working was to make the entire exhausting stroke of the piston, then close the exhaust valve and open the charging valve and let the combustible charge follow the cylinder for say one-eighth of the working stroke, then close the supply valve and ignite the charge, and drive the piston the remaining seven-eighths of the working stroke by the fire.

Perry says his cylinder works hot, and that to keep it cool he proposes to case the cylinder in, and force air through the casing with a fan. Frayer-Miller takes notice that they are infringing Perry's 1844 claims.

Perry's first motor used a hollow revolving admission valve, charge under pressure inside, and ports to register with the cylinder ports during admission time.

Thus the first American gas engine patent, May 25, 1844, throws open the broad elements of the air-cooled double acting two-cycle motor. It is true that the ignition was by a flame, and that the charge was very slightly compressed, and was not compressed at all by the working piston, and that the exhaust port was not next to the piston at the end of the working stroke, as in the crank box pressure two-cycle motor of to-day, but was placed as in a steam cylinder, at the end of the exhausting stroke of the piston, but for all that Perry had the ground work of the two-cycle motor, air-cooled, and his patent throws this motor, with a supply cylinder, open to the public.

Perry did a lot of work on his gas engine and took out another patent, No. 4800, October 7, 1846, claiming New York as his residence, the drawing looks much like a horizontal steam engine of that date, governor and all. In the specification of ths second patent Perry says that water is the best thing to cool his cylinder with, and shows a water jacket, and also a water groove in his piston, with a water port in the cylinder at each end and a double acting water pump to fill the piston groove with water at each end of the stroke, and to fill a chamber through which the piston rod worked. Perry also added a hot platinum igniter, many years before Daimler's time, and seemingly a full anticipation of Daimler's vaunted hot-tube ignition, and an air pump to fill an air chamber so as to have compressed air to start his motor. Turpentine seems to have been his choice for fuel, vaporized by heat. The valves were four puppets, worked by a cam shaft and cams. The claims of this patent cover the water jacket, injecting cooling water into a gas engine cylinder, injecting water into the piston rod stuffing box, the screened hot platinum igniter and the receiver for compressed air for starting.

Million, Paris, France, American patent 63,416, April 2, 1867, mentions electric ignition with a coil, spark points insulated to inside of cylinder, and used a slide valve and cut-off valve, with water cooling all round. Million knew little about the use of flame, as a motive agent in a cylinder, and ignited his charge under a primary piston and used the exhaust to drive his working piston.

Charles P. Leavitt, New York, patent 118,028, American, August 15, 1871, shows two cylinders, pistons same stroke and diameter, the supply piston being 90 degrees in advance of the working piston. The charge was fired when the working piston stroke began, and the admission valve was closed when the supply piston working stroke ended, leaving the working piston to make the last 90 degrees of its working stroke by expansion. Leavitt used a trunk piston and cranked shaft.

James Robson, North Shields, England, American patent 220,174, September 30, 1879, shows a single or double acting two-cycle motor, piston and rod, both ends of cylinder closed, the exhaust stroke on the working side of the piston drawing a charge in on the compressing side, and compressing the charge into a reservoir during the working stroke, and then, by a slide valve, letting the fired charge into the cylinder during the working stroke. This is an approach to the crank box pressure two-cycle motor, but yet a long way from it. Robson's form of motor, cylinder closed at both ends, with piston rod and cross head, single acting cylinder, idle end used for charge compressing, has been followed by many subsequent inventors, and can make a good motor, but is too long for convenient use in motor car driving, which demands the most compact form of motor consistent with durability and fuel conomy.

Robson is followed by a large number of inventors, American and foreign, using a working piston and a heavy pressure supply piston.

FIRST CRANK BOX SUPPLY.

Lewis Hallock Nash, Brooklyn, N. Y., a prolific producer of gas engine designs, seems to have been the first to extend the idle end of the cylinder so as to make it box in the crank, and use the working piston as a charge compressor to fill the crank box with compressed mixture ready to rush into the two-cycle cylinder when the intake port was opened.

Up to Nash, who filed his first application on the two-cycle gas engine with crank box pressure in 1885, and who seems to have been the first inventor of the two-cycle motor with both exhaust and intake ports in the cylinder close to the end of the working stroke travel of the piston in the cylinder, which is a characteristic of what is now implied by the term "two-cycle motor," many inventors experimented with the two-cycle gas engine and supply cylinder in a great variety of forms, but no one before Nash seems to have been bold enough to attempt to fill the gas engine cylinder with a combustible mixture which must not be ignited at the time of admission, at the very same instant that a passage was opened to empty this flame-filled cylinder.

Before this 1885 application was filed Nash himself, in common with many others, was working on various highly ingenious combinations of the supply cylinder and piston, valves and a working cylinder and piston, in which the combustible charge was first drawn into the supply cylinder and compressed, either lightly, as by Perry, 1844, or up to 60 or 80 pounds, as by later experimenters, and fired sometimes before it reached the working cylinder and sometimes after the charge was wholly in the working cylinder, many of the Nash inventions being carefully worked out, as well as complicated in form and comparatively slow, probably, in action.

Clark Sintz, then of Springfield, Ohio, was granted American patents No. 339,225, April 6, 1886, and No. 383,775, May 29, 1888, on a gas engine with a separate compression cylinder, and an intake valve, here mentioned as showing that Nash and Sintz travelled independently over the same ground to reach the crank box pressure two-cycle motor.

Nash was granted two patents, Nos. 386,209 and 386,211, July 17, 1886, both showing the use of crank box pressure, of which No. 386,211 had the application filed first, November 5, 1885, renewed October 5, 1886, and again renewed June 21, 1887, giving this patent No. 386,211 the earliest record in the American Patent Office of a two-cycle motor using crank box pressure, intake and exhaust ports at the end of the piston working stroke, and a deflector, so as to make what is now known as a two-cycle motor, using crank box pressure. This motor had an automatic crank box intake valve and a governor controlled throttle in the side pipe from the crank box to the cylinder intake port.

A second figure in the drawings of No. 386,211 shows the side pipe extended to make the charge enter the cylinder through the cylinder head, at the point farthest away from the piston at the end of its working stroke, the exhaust port remaining in the position shown in the Nash illustration given, close to the piston at the end of its working stroke. This second drawing is not reproduced, but is mentioned here as showing that at this time Nash was not sure that it was safe to admit the charge at the end of the working stroke of the piston.

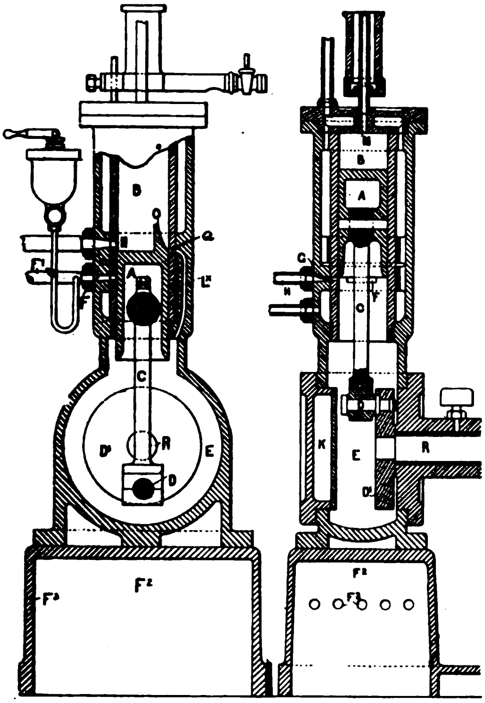


Fig. 4. F. W. Cock, Am. Patent 544,210, August 6, 1895, gas engine, mid-vertical section, crosswise; also, same, partial lengthwise. A, Piston. B, Cylinder. C, Connecting rod. D, Crank wrist. D1, Crank. E, Crank box. F, Air port. G (not marked), Gas or fuel admission port. Lx, Side pipe or by pass, from crank box to cylinder. M, hot igniting tube. N, Exhaust. O, Deflector. Q, Cylinder intake port. R, Crank shaft. F1 is not mentioned in the specification.

Note.—Lx performs the same office in the Cock engine as e, h2, h, and h1, in the Sintz engine.

Cock admits both fuel and air to the crank box. Sintz admits air only to the crank box. Leakage from the Cock crank box wastes fuel. Leakage from the Sintz crank box wastes compressed air only.

At the date of this Nash application, 1885, little was known of the small gas engine, either four-cycle or two-cycle, the speed was slow, and the power not more than a quarter or a third of what would be expected from equal bore and stroke at the present time, and this Nash 1885 two-cycle was probably regarded as satisfactory so far as power for size and weight was concerned. This Nash patent, 386,211, issued in 1888, expired in 1905, and made crank box pressure with the side pipe, the automatic crank box intake valve and the cylinder and intake ports near the end and the deflecting plate on the piston, all public property. The radical defect in this motor is lack of charge volume enough to fill the cylinder. No four-cycle motor sucking its charge into the cylinder ever fills the cylinder to atmospheric pressure, but the four-cycle can do a third more work than the same size two-cycle, one-diameter piston and crank box pressure, because the most the two-cycle ordinary form can do is to draw the bulk of its own piston displacement into the crank box, and not nearly so much can be transferred from the crank box to the working cylinder; this makes the ordinary two-cycle motor less powerful than the same size four-cycle motor.

Because of this the two-cycle piston has been made with two diameters, two pistons in one, the smaller piston moving in the working cylinder, and the larger one in another cylinder, often integral with the working cylinder, the larger piston sucking or forcing mixture into the crank box, so as to give a working cylinder full of mixture before compression, which should make the two-cycle motor even more powerful than the same size four-cycle.

An example of this integral two-diameter piston is shown, but is not claimed, in American reissued patent 10,878, November 1, 1887, to Schmid and Beckfeld, patent now expired, making this two-diameter piston public property, but this form of piston makes a long or high engine, and is adapted to crank box pressure only.

Nash does not show the crank box intake port covered and uncovered by the piston, and therefore missed the "three-port" part of the combination.

Clark Sintz, American patent 509,255, November 21, 1893, five years after Nash, shows the three-port two-cycle motor, with pure air in the crank box and a carburetor in the short side pipe to the cylinder intake port, crank box intake port just under the cylinder exhaust port, the short side pipe being opened to the crank box by a hole cut in the piston wall. This Sintz three-port patent will expire November 21, 1910, and this patent and Cock's American patent, No. 544,210, August 6, 1895, are both owned by Mr. James Whittemore, Detroit, Mich., said to represent the Olds Motor Works, who is demanding pay from those who have made and are making crank box pressure two-cycle motors with the crank box intake port covered and uncovered by the working piston, "3-port" style.

This makes the full import and true meaning of these two patents, No. 509,255, Sintz, and No. 544,210, Cock, of interest to many persons who have been and still are making three-port crank box pressure, two-cycle gas engines.

The Sintz shows three ports, 'a crank box intake port, g, a cylinder, intake port, h1, and an exhaust port, f. The opening, e, in the piston and its coacting passage, h2, in the cylinder, are insignificant, as, together with the passage, h, they merely open communication from the crank box to the cylinder when the cylinder intake port, h1, is open to the cylinder, same as is done in the Cock patent by the plain by-pass or side-pipe, Lx, hence both Sintz and Cock show the same ports, three each.

Sintz takes pure air only into the crank box and admits his fuel to the compressed air just as the air enters the cylinder. Cock takes both air and fuel into the crank box. Cock can fire the crank box charge, and Sintz cannot fire it save as to this one matter of fuel in the crank box the two motors are identical.

Nash, earlier than Sintz and Cock, does not show three ports coacting with the piston, as his crank box is supplied through an automatic valve, nor does Nash show the exhaust open before the cylinder intake is open. Sintz in his specification and claims is clear in his description and claims to the advance opening of the exhaust, though his language requires some consideration, and so far as the face of the patents is concerned seems to have been the first to show the three-port crank box pressure two-cycle gas engine, ports open and closed by the working piston. The point of priority between Sintz and Cock is now of but little importance, as both patents are the property of Mr. Whittemore, who holds all that both cover.

WHAT 2-CYCLE ELEMENTS ARE FREE.

No one now makes any claim to the two cycle motor with the intake and exhaust ports near the end of the working stroke travel of the piston, exhaust open before intake begins, nor to the supply cylinder and piston separate from the working cylinder and piston, sucking a supply of mixture through a carburetor.

The two-diameter integral piston is also old and free, and by the use of this double piston and an automatic crank box intake valve an efficient two-port, two-cycle motor can be made, though it must be higher than the single piston motor.

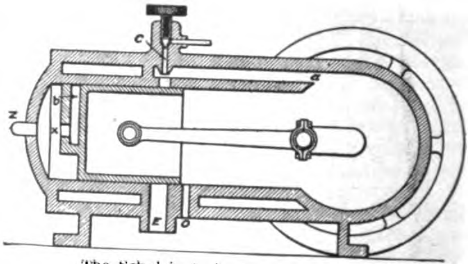
Crank box pressure is objectionable in many ways, and some other form of two-cycle motor seems likely to be preferred for automobiles, indications pointing to the separate supply cylinder.

The pressure of the charge needed to insure the entrance of the charge to the working cylinder is very slight, and the supply cylinder and piston can both be light, and little power is required to drive the compressor.

The two-cycle requisites seem to be a sufficient volume of compressed charge to completely fill the working cylinder down to the exhaust port, and as nearly an equal velocity of air through the carburetor throat passed the gasoline stand pipe as may be. The compressor, which may have automatic valves, must. of course, be capable of working at high speed, and must be durable.

A SWISS 3 PORT PATENT.

(Since the above was written, a Swiss patent, No. 4395 on 3 port 2 cycle engines, has come to light, granted to Julius Schnlein. This was applied for on Nov. 27, 1891, and published in March, 1892, and seems to be a clear anticipation of the Sintz patent. In the accompanying illustration "O" is the port to crank case, "A" the by-pass to compression chamber, "C" the gasoline inlet port, and when piston has returned on the exhaust stroke the charge enters the compression chamber through the passage "B" in the cylinder head. "E" is the exhaust port.



The Schnlein Swiss 3-port, 2-cycle engine.

The importance of this patent in the situation is due to the fact that in the affidavit made by Sintz, May 1st, 1892, is given as the time his engine was made and put into use, which is somewhat over a month later than the publication of Schnlein's patent.—Ed.)

Sudden Carburetor Suction

HUGH DOLNAR.

Where the ordinary form of float feed and constant level of gasoline in the carburetor stand-pipe is used, it is well known that the velocity of the air as it passes the stand-pipe nozzle determines the amount of gasoline sucked out of the stand-pipe. Most 2-cycle car-motors use this float feed and constant level stand-pipe carburetor. In all 3-part 2-cycle motors the crank-box intake from the carburetor is open for only a very short time, only a very small fraction of a second if the motor is running fast. The 2-cycle motor has been known to make 2000 R. P. M., or 33 turns, say, per second, and this would make the crank box charge go through the carburetor in one one-hundred and thirty-second part (1-132) of one second, if the crank box intake port was open for 90 degrees of crank time. In practice this port is open through only say 60 or 70 degrees of crank angular advance, so that the crank-box charge must pass the carburetor in less than the small part of a second specified, at the R. P. M. mentioned. Although at high speeds the crank-box port is open much less time than at low speeds, the air velocity through the carburetor is so very much greater when the motor runs fast that the charge is not uniform at different speeds, and is either too rich at high speeds, or too lean at low speeds, to give good results. This is probably one cause of the 2-cycle reputation for "inflexibility." In practice, a car which weighed about 2000 pounds was driven over 30 miles by a 2-cycle motor on one gallon of gasoline at good pace, and would not make less than about 14 miles per hour without

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missing explosions, showing higher carburization at high speeds, through a Kingston carburetor, than at low speeds. To make this same car run as slow as 4 miles per hour on high gear, the maximum mileage was cut down from 30 to 20 per gallon of gasoline. That is to say, to give the motor fuel enough to run when the slow air went through the carburetor, the fast air through the carburetor was made to suck out a third more gasoline than was needed, from the carburetor stand-pipe.

If the automatic crank-box intake valve was fitted in place of the third port, then the air would have always nearly 180 degrees of crank time to fill the crank-box, or much more than twice the time, same R. P. M. as that given with the third port, covered and uncovered by the piston.

It seems probable that the superior flexibility of the 4-cylinder 4-cycle motor is largely due to the smaller air velocity variations in the carburetor throat, where the air passes the stand-pipe. These velocity variations are intended to be connected by the "supplemental" air valves, shown in carburetors of today in an endless variety of forms and placing.

It is not impossible that means may yet be applied to obtain a continual flow of air through the carburetor, and that when this is done the supplementary carburetor air-valves will be found superfluous, and the 2-cycle motor will become as "flexible" as is needful.

The double acting supply cylinder and piston would cause much less variation of air-velocity through the curburetor than either the automatic valve or the third port for crank-box intake, but would yet give large air-velocity variations owing to the crank-time of the supply cylinder piston, but if this supply charge went to a reservoir to supply a multi-cylinder motor, the average of carburization of the charge might be found satisfactory. Or again, suppose a 3-cylinder motor to be fitted with 3 single acting supply cylinders, the air speed through the carburetor would become yet more nearly uniform for a given motor speed, with a possibility of wholly satisfactory carburetor performance at both high and low motor speeds.

The Association Patents Co., an offspring of the Association of Licensed Automobile Manufacturers, has acquired the Canfield and Mueller spark plug patents, which they claim cover all spark plugs which have an annular air gap.

S. F. Edge, of the Napier Motor Co., of England, has announced that his company will guarantee their cars for three years against constructional faults or failures, and will also guarantee to deliver cars on the date promised under a forfeit of $100 every week for anything over that time.

An automobile hill climb will be held on May 10th, at Wilkes-Barre, Pa., which is the opening day of the Centennial Jubilee. The distance of the climb will be two miles, and the grade in places is as much as 26 per cent. The climb will be under the auspices of the Wilkes-Barre Automobile Club.

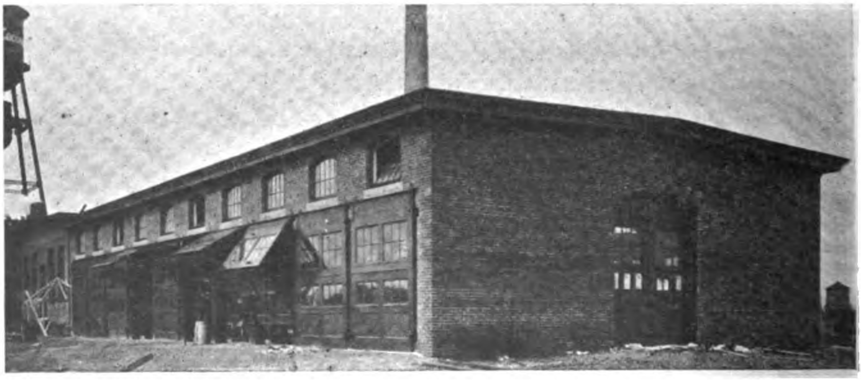
The Rainier Company will open a branch in Philadelphia under the management of A. J. Picard.

The New York Motor Club has decided to repeat its Orphan's Day Automobile Outing, but the date will be in the fall instead of the sqring.

Charles E. Miller, 97-101 Reade street, New York, has renewed for 1906 his contract to act as sole American agent for the Brampton claims made in England.

Owing to the increase in garage rents, the New York Automobile Trade Association contemplate advancing the storage rates for automobiles about 10 to 15 per cent.

It is stated that the profits of the Madison Square Garden Show amounted to over $60,000. The A. L. A. M.'s share, $30,000, was rebated to exhibitors, reducing their space rentals by about 35 per cent.



The latest addition to the factory of the Locomobile Co. of America, Bridgeport, Conn. A brick garage having a number of special features, among which probably the most noticeable and important are the doors which form the two sides of the building. There are ten of these on each side. Four of them are shown in various positions, while six are closed. When fully open the door is raised to a height of 9 or 10 feet and forms a sort of an awning. They are easily raised, being weight balanced and will stay in any position. The heating apparatus consists of a long pipe running the full length of the building with open ends, and hot air taken from a steam coil is forced into this pipe and out through the various openings. A mezzanine floor is located at one end, with lockers for the use of the chauffeurs, the staircase to it being hinged so that it may be swung up when not in use. The floor is of concrete with eight pits. The Locomobile Co. is also building another brick addition to relieve the crowded condition of some of its departments.

MONOGRAMS

...and...

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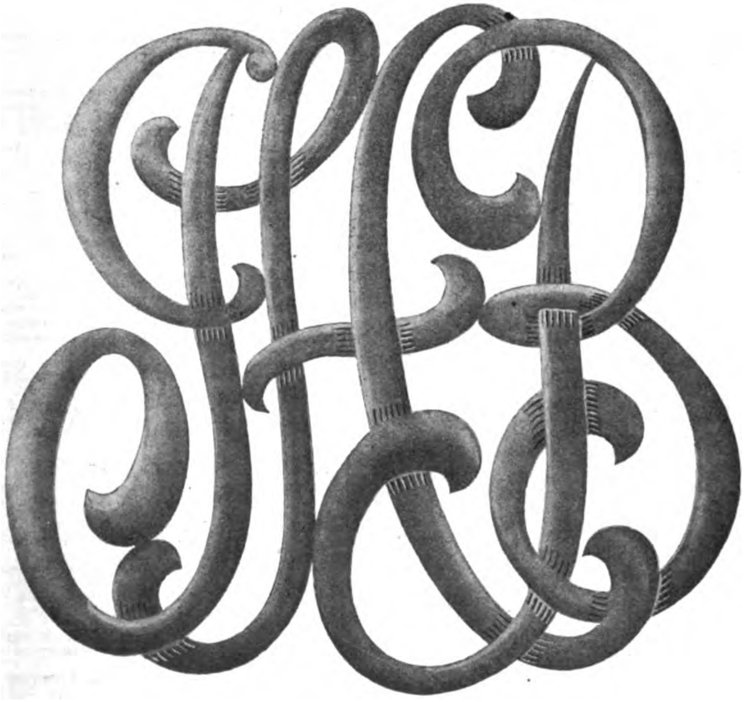
for
AUTOMOBILES



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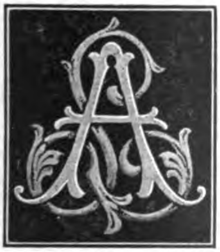
DEALERS! We want to establish agencies all over the country for the sale of these Monograms. Write at once for our splendid, money-making proposition. Don't let your competitors get in ahead of you.



The J. W. Colgan Co.

Sudbury Bldg. Sudbury St.,

BOSTON, MASS.

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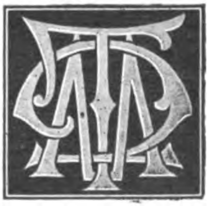


Retail Notes

Allen, Asten & Co., agents for the Reo car in Greenwich, Conn., with temporary garage at 90 Arch street, are now building a large garage which will be equipped with all modern machinery.

American Motor Car Co., The, of Boston, Mass., have recently been organized and located at 70 Kilby street. They will handle the American car.

The Atwood Automobile Co., of Toledo, O., is erecting a building 100x200 ft. in size, and fireproof, being constructed of brick and concrete. An open floor space of nearly 13,000 square feet will not contain a single post.

Boyd, D. H., has opened a garage in Newark, N. J., at 40 Sherman street, as the Astor Garage.

Barnes, G. H., is preparing to open salesroom at 207 Church street, Poughkeepsie, N. Y., with the Reo as a leader.

Brooklyn Automobile Exchange is the correct name of the concern which located at 224-226 State street, Brooklyn, N. Y., instead of the Barber Automobile Garage, as it appeared in our February issue.

Babbitt, F. O., and T. B. Matthews will open a garage and repair shop on Willow street, Fitchburg, Mass., having leased the Brown building for the purpose. The building is 75x25 feet.

Duncan, W. A., has secured the agency for the Ford cars in Rolla, N. D.

Dyer, George F., has leased the Swett stable property, Manchester, Mass., and will do business as Dyer's Auto Depot. The garage will be opened April 1.

Electric Automobile Co., The, is the name of the new organization recently formed in Savannah, Ga., with a capital stock of $20,000. They will deal exclusively in electric automobiles, having purchased the business of the Electric Supply Co. They are located in a new building on Bryan and Bull streets, having a floor space of 12,000 square feet, and equipped with all modern appliances.

Egan & Grinnell are conducting a large garage at Seabreeze, Florida, on the boulevard leading from Daytona to the Ormond-Daytona beach. The garage is equipped with lathes, a 16-in. stroke shaper, milling machine, drills, grinders and vulcanizers.

Fowden, William, fire commissioner of Atlantic, is having plans prepared for the erection of a fire-proof, four-story garage for that resort.

Fenner, F. H., local agent for Winton and Cadillac in Bay City, Mich., has completed his fire-proof garage. The building is built of steel, cement, brick and concrete floors. There are 7,500 square feet of floor space.

Graybill, Samuel, is erecting a garage at Elizabethtown, Pa., on the Engle property, opposite the Exchange Bank.

Indiana Automobile Company, Indianapolis, Ind., have the agency for the Autocar, Cadillac, Oldsmobile and Winton machines.

Iowa Vulcanizing & Tire Co., which will be run in connection with the Davenport Automobile Co. at Davenport, Ia., has been organized by Ourey Jansen. A. B. Craft, formerly with the Fisk people, will install the plant and manage it.

Johnson, Walter B., Essex Junction, Vt., is the exclusive agent in Vermont for the Buick automobile.

Kirk Brothers' Automobile Co., which will open a garage on Jefferson avenue, Toledo, Ohio, have taken the agency for the Babcock and Oldsmobile. They also intend to handle commercial cars.

Light, Oliver, and O. D. Purroy have the agency for the Oldsmobile at 531 North Howard street, Baltimore, Md. An extension is being made to the building which was recently erected and an automobile school, the first in Baltimore, will be carried on in connection with the garage business of the concern.

McKinley Motor Car Co. will open a garage in the new building on Main street, East, Rochester.

Morse, Thomas W., a dealer of Lenox, Mass., will enlarge his garage by building an addition 32x46 feet. Mr. Morse handles in addition to the Pope line the Rainier and Berkshire.

Millard & Son, James, will erect a garage 60x80 feet adjoining their machine shop on Broadway, Kingston, N. Y.

Miller, F. E., of Princeton, Ill., has opened a garage at 440 Main street.

Newmark, M. A., is erecting a garage on south Spring street, Los Angeles, Cal., which will measure 100x60 feet.

Randolph, Theo., of Nyack, N. Y., has purchased a place in Burd street, and will open a garage on April 1. He will represent the Maxwell cars.

Rubay, Leon, a dealer of New York City, in French automobile supplies, is establishing a branch in Boston, at 242 Columbus avenue.

The Rainier Co., of New York City, have established agencies with the Van Automobile Co., St. Louis, for the State of Missouri and Southern Illinois; Paxson Motor Car Co., Cleveland, for the State of Ohio; A. H. Hayes, San Francisco, State of California; Plaza Automobile Co., of Brooklyn, T. S. Morse, Lenox, Mass., the Berkshire District.

Roanoke Automobile Co., The, of Roanoke, Va., will build a garage to cost $3,000.

Smith, Benj., who is agent for automobiles, marine engines and motor cycles will remove April 1, from 319 Columbus avenue to 364-66 Columbus avenue, Boston, Mass.

Seacoast Garage Co., of Long Branch, N. J., are building a garage at Brighton and Norwood avenues to cost about $22,000.

The Toledo Motor Boat and Power Co. have erected a garage at Fulton and Batavia streets, Toledo, Ohio, which will be operated under the name of Fulton Street Garage Company.

Valley Automobile Co., of Warren, Ohio, have recently opened a new garage and repair shop in that city with about 6,000 square feet of floor space, where they will have ample facilities for storage, care and repair of cars.

Wyoming Valley Motor Car Co., The, is the style of the new concern recently organized in Wilkes-Barre, Pa., to do a general garage business. It has located at 35-37 North Washington street.

Wiss, Victor A., a dealer of Morristown, N. J., has formed partnership with his brother, Thomas H., and the new concern is known as Victor A. Wiss & Bro. They will build a stone garage on Pine street, 50x150 feet, making a total floor space of 9,000 square feet.

Weaver, W. E., agent for the Maxwell cars, in Portsmouth, N. H., will open a garage near the corner of Fleet and Congress streets, that city.

Whipple Cycle Co., 260 West Jackson boulevard, Chicago, Ill., have added the Yale motorcycle to their agency for 1906.

Trades Changes

Auto Top Co., of New York, has been taken over by a newly incorporated concern called the Motor Top Co.

Aurora Automobile Co., of Aurora, Ill., machinery and stock has been sold to the Genoa Automobile Co., of Genoa, Ill.

Auto Vehicle Co., Newark, N. J., have removed from Orange street to the company's new building at 213-215 Clinton avenue.

Curtiss & Tomlinson, of Derby, Conn., in order to take care of the automobile business as well as the carriage and wagon, have formed another company known as the Derby Automobile Co., and the carriage business will be carried on by the original concern.

Clenzol Co., The, manufacturers of Clenzol, have recently removed from Newport News, Va., to Washington, D. C.

Crane & Richardson, 112 Water street, Boston, Mass., have been succeeded by the Eliot Engineering Corporation, 299 Marginal street, East Boston, Mass.

Cleveland Cycle & Auto Co., of Buffalo, N. Y., have increased their capital from $2,500 to $5,000.

Diamond Stamped Ware Co., The, Detroit, Mich., filed an amendment to its articles changing the name of the corporation to Diamond Mfg. Co., and increasing the capital stock from $100,000 to $300,000.

Duluth Electric & Construction and the Duluth Automobile Co., have consolidated and will locate at 210 West First street, Duluth, Minn.

Electric Supply Co., of Savannah, Ga., has been succeeded by the Electric Automobile Co., on Bryan and Bull streets.

Essex Automobile Co., The, of Newark, N. J., have removed from Lombardy street to 79 Orange street.

Fahnestock Electric Co. have removed from 132 Havemeyer street to 129 Patchen avenue, Brooklyn, N. Y.

Gearless Transmission Co. have removed from Glen Falls to Rochester, N. Y.

Greene Motor Car Co. removed from their temporary quarters, 222 Halsey street, to 88-90 Washington street, Newark, N. J.

Hawkins & Moore, of Woodland, Cal., have sold the Woodland Garage at that place to H. H. Luck, of Woodland, and George Bielar, of San Francisco, who will continue the business.

Halliday, C. A., business consolidated with the Schubert Bros. Gear Co., Oneida, N. Y.

Hoffman Hinge & Foundry Co., Cleveland, O., have been succeeded by the New Ferro Machine and Foundry Co.

Hilderbrand, Ed. L. & Son, of Sullivan, Ind., have been succeeded by the Hilderbrand Tire and Vulcanizing Co., Fort Wayne, Ind.

Kansas City Motor Car Co., The, Kansas City, Mo., have moved to their new plant near Sheffield.

Lincoln Automobile and Carriage Co., 216 West Fiftieth street, New York City, have been absorbed by the Motor Top Company.

Manufacturers' Foundry Co., The, Waterbury, Conn., Geo. W. Beach, president and treasurer of this concern, died on March 2nd.

National Sales Corporation, 256 Broadway, New York City, management has passed into the hands of Joseph Grossman, succeeding E. J. Kugeman.

Northern Mfg. Co., of Champlain street and Canton avenue, Detroit, Mich., have changed their style to Northern Motor Car Co.

Otten, John C., dealer in bicycles, motor cycles and sundries, has removed from Melville, L. I., to Farmingdale, L. I.

Pedersen, J. T., 636-644 First avenue, New York City, has been succeeded by the Pedersen Mfg. Co.

Practical Auto Mfg. Co., Aurora, Ill., have been reorganized as the Practical Automobile Co., of Genoa, Ill., with the following-named as incorporators: Thos. S. Sager, John Hadsall, J. B. Stephens, and T. W. Hoover.

Garford Co., Elyria, Ohio, have been absorbed by Studebaker Automobile Co., of South Bend, Ind.

Rollins Mfg. Co., Park Square Motor Mart, Boston, Mass., have been succeeded by the Hoffecker Speed and Mile Register Co.

Studebaker Automobile Co.'s Kansas City branch has been changed from 810-814 Walnut street to Thirteenth and Hickory streets.

Smith, Benj., agent for Compound motor cars, marine engines and Merkel motor cycles, will remove April 1 from 319 Columbus avenue to 364-366 Columbus avenue, Boston, Mass.

Salisbury Wheel & Mfg. Co., of Jamestown, N. Y., stockholders voted to increase the capital stock from $50,000 to $100,000.

Standard Roller Bearing Co., Forty-ninth and Girard avenue, Philadelphia, Pa., have increased their capital stock from $2,000,000 to $3,500,000.

Wiss, Victor A., dealer in automobiles and supplies, has been succeeded by a new concern known as the Victor A. Wiss & Bro., Morristown, N. J.

Wing Motor Car Co., F. E., agent in Boston, Mass., for the Marmon, have removed from 66 Stanhope street to 12 Motor Mart.

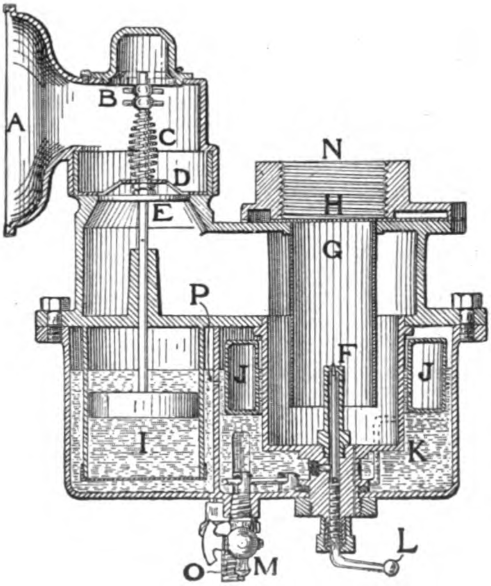
Wheeler Manufacturing Company, 51-55 Macomb street,

SOMETHING NEW and
SOMETHING BETTER

Increased Power-Speed Engine Efficiency

Result from the use of the

"MENNS" CARBURETOR



Simple and practical in construction, and may be easily taken apart and cleaned. Gives the best possible mixture at all engine speeds, perfect control with but one lever, and immediate starting under all conditions. Absolutely noiseless.

Made in brass and aluminum, with either vertical or horizontal inlet.

Write for catalog and opinions of users.

BOSTON MECHANICAL CO.
22 Park Square Motor Mart, Boston, Mass.

H. E. WHITING, Treas. and Mgr.

corner Beaubien, Detroit, Mich., have changed their name to the Rands Mfg. Co.

West, Hubbard & Kerns have discontinued their garage on Washington Boulevard, Detroit, Mich.

Young & Miller, 254 Jefferson avenue, Detroit, Mich., have been succeeded by Fee & Bock.

Williams & Son, G. G., have removed from Charlevoix, Mich., to New Bedford, Mass.

Fires and Judgements

Auto Brass & Aluminum Co., Flint, Mich., is in the hands of George A. Marston, as receiver in bankruptcy. The assets are about $10,000 and liabilities about $28,000.

Boston Cycle & Sundry Co., Boston, Mass., 42-46 Hanover street, burned out; loss not fully estimated.

Monarch Automobile Co., of North Aurora, Ill., personal property sold at bankruptcy; sale on March 5, to L. M. Grant, of Chicago, for $3,700.

Pierce, George N., Co., The, 752-8 Main street, Buffalo, N. Y., fire damaged one of their warerooms on Main street, February 25; loss estimated between $60,000 and $75,000. It is fully covered by insurance.

Place, Ned, Tampa, Fla., bicycle shop destroyed by fire; partially insured.

Stewart, George, Camden, N. Y., destroyed by fire; fully insured.

Legal and Legislative

CALIFORNIA

Los Angeles.—There is a law on the statute books which provides for a tax on all vehicles. The Los Angeles city assessor has decided that all automobiles in the city, irrespective of whether they are the property of residents or visitors, come under the terms of this law and has accordingly assessed the cars of all tourists.

Mr. E. R. Thomas, the Buffalo automobile manufacturer, shipped one of his cars to the coast for his use, and he was asked to pay $33.60 for the privilege of running it there. He paid the tax under protest, and for the protection of other tourists immediately engaged an attorney, Mr. H. C. Brown, and will fight the city assessor's interpretation of the law.

Mr. Thomas will, if necessary, he says, carry the case to the Supreme Court of California. He gives as his main ground for his fight against the tax the fact that he pays taxes on all his cars at Buffalo, and does not believe his personal property can be assessed legally in two States.

FEDERAL.

The United States Senate has passed a bill providing for the federal licensing of motor boats of less than fifteen tons that are used for the transportation of passengers. The bill is not a drastic one. It only covers a few points requiring that at least one life preserver must be carried for every person transported, which certainly is not an unreasonable provision for safety. The operator must be licensed so that there will be means of preventing those who are conspicuously unfit from engaging in this business and thus endangering the lives of passengers.

NEW JERSEY.

The Frelinghuysen substitute bill which is but slightly changed from the original measure, against which such a protest was made by the autoists of this and other States, goes through the Senate by a vote of 17 to 2. The bill as it passed the Senate and stands before the House is: It provides for the creation of an expensive automobile department, with the Assistant Secretary of State as chief commissioner, for arrest without warrants, $3 and $5 taxes per year on all machines, and the limiting of speed to twenty miles an hour in country districts and seven miles an hour in towns. The present license fee is $1 for a machine in perpetuity.

Chatham.—The Common Council unanimously passed a resolution on March 5 providing for crosswalks five inches high to retard the speed of automobiles passing through the town. Work on the first of these crosswalks will be started by the road authorities as soon as the material can be obtained. Doubt as to the fate of the Frelinghuysen automobile bill is reported to have been one of the chief reasons for the action of the Council.

NEW YORK.

Albany.—The General Laws Committee of the Assembly has reported favorably the measure amending the motor vehicle law which Mr. Lee, of Lockport, introduced and which substitutes for the present provisions requiring the operator of a motor vehicle to stop it when the owner of a restive horse signals him to do so, a new provision requiring that when a motor vehicle approaches a horse or draft animal being driven or led, the operator shall reduce the speed to a mile in six minutes as soon as he comes within twenty yards of the animal, and then to stop it within ten yards if the animal shows signs of fright, unless the driver or leader of the animal shall indicate by a nod or wave of the head or hand that the motor vehicle need not stop.

The Hartford Suspension Company, of New York, have been denied by court the injunction applied for restraining the Hollander & Tangemann Company from selling the Diezemann shock absorber on their cars, claiming the same to be an infringement of its patents which it alleges entirely cover every form of rotary retarding devices for vehicle springs and also to restrain Hollander & Tangemann from using the term "shock absorber" as applied to retarding devices, which term it alleges to be its trade mark.

NORTH CAROLINA.

Reidsville.—Council passed an ordinance prohibiting the use of motor cycles on the highway. The court on March 2 ruled in the case of Mr. Carroll against Reidsville township that the ordinance was clearly unconstitutional and could not prevail. The case in question is the one in which Mr. Carroll was arrested and fined $2 for riding his motor

A. A. A. Racing Board

At a meeting of the board of directors of the American Automobile Association March 8, Jefferson De Mont Thompson, a broker of New York City and a member of the Automobile Club of America, was appointed chairman of the racing board of the A. A. A.

An important feature of Mr. Thompson's appointment to the chairmanship of the committee named is that it makes him also chairman of the Vanderbilt Cup Commission.

The new chairman succeeds Robert Lee Morrell, who absolutely refused to retain the office.

The following gentlemen will constitute the Racing Board of the American Automobile Association for the year 1906.

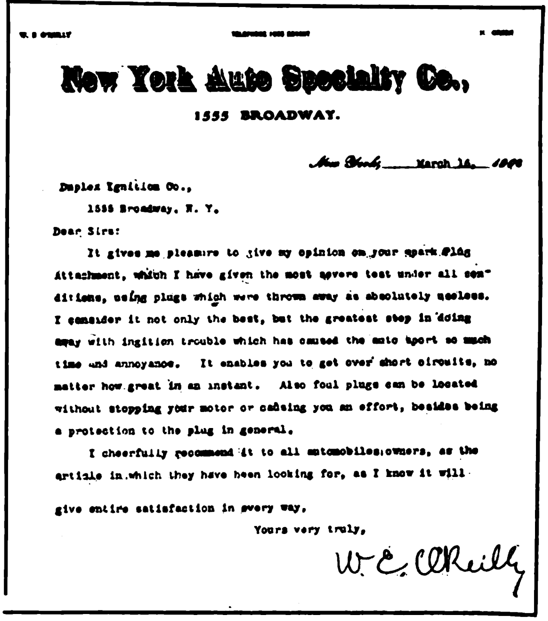
Jefferson deMont Thompson, Chairman.
William K. Vanderbilt, Jr., A. C. A.
E. Russell Thomas, A. C. A.
Samuel Walter Taylor, A. C. A.
A. G. Batchelder, New York Motor Club.
S. M. Butler, A. C. A.
H. L. Bowden, B. S. A. A., Boston.
R. Lincoln Lippitt, R. I. A. C., Providence, R. I.
Frank G. Webb, Long Island A. C.
Ira M. Cobe, Chicago Automobile Club.
George L. Weiss, C. A. C., Cleveland, Ohio.
E. H. R. Green, Dallas Auto Club, Dallas, Texas.
Dr. W. H. Bergtold, C. A. C., Denver, Col.
L. P. Lowe, A. C. C., San Francisco, Cal.

Technical advisors to the board (without a vote in the board acting only in an advisory capacity) are: Peter Cooper Hewitt, of New York; E. R. Thomas, of Buffalo; A. L. Riker, of Bridgeport, Conn.; Henry Ford, of Detroit.

The other chairmen of the A. A. A. Committees are: Touring Committee, Paul H. Deming, and Highway Committee W. H. Hotchkiss.

Paul S. Deming, the new chairman of the Touring Committee of the American Automobile Association, is one of the most experienced tourists of the country, having participated in all of the early contests. Mr. Deming, who is now a resident of Detroit, has spent much time in touring abroad during the past 18 months.

The First Annual Automobile Show under the auspices of the Auditorium Co. and Omaha Automobile Dealers' Association will be held at the Omaha Auditorium on April 4, 5, 6 and 7, 1906. R. C. Dozier, 1508 Howard St., Omaha, Neb. is advertising manager.



New York Auto Specialty Co.,

1555 BROADWAY.

New York March 14. 1906

Duplex Ignition Co.,
1555 Broadway, N. Y.

Dear Sirs:

It gives me pleasure to give my opinion on your spark Plug Attachment, which I have given the most severe test under all conditions, using plugs which were thrown away as absolutely useless. I consider it not only the best, but the greatest step in doing away with ingition trouble which has caused the auto sport so much time and annoyance. It enables you to get over short circuits, no matter how great in an instant. Also foul plugs can be located without stopping your motor or causing you an effort, besides being a protection to the plug in general.

I cheerfully recommend it to all automobiles owners, as the article in which they have been looking for, as I know it will give entire satisfaction in every way.

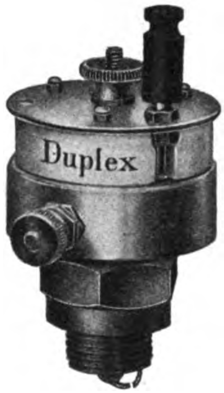
Yours very truly,

W. E. O'Reilly

Plugs Foul?

PULL THE SWITCH!

No Delay
No Annoyance
No Stoppage



Guarantee to Fire Your Plug no Matter How Foul

The Duplex Attachment Fits any Plug Sold.

Protects Against Rain or Dampness

Great for

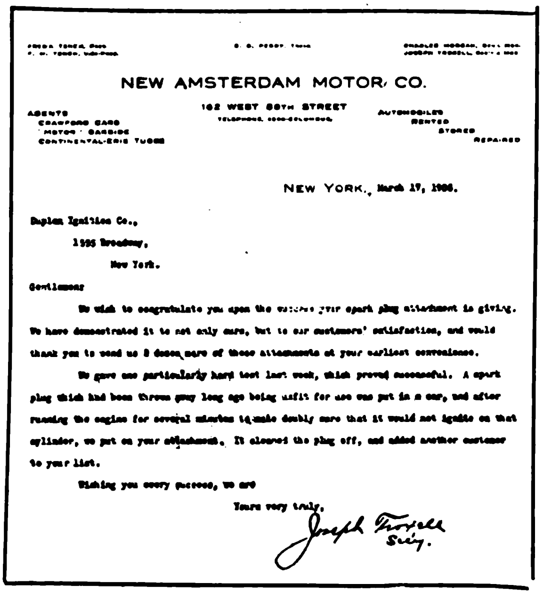
HIGH COMPRESSION

Motors and Marine Work

Price $2.50

Duplex Ignition Co.

1555 Broadway,
New York.



NEW AMSTERDAM MOTOR CO.

162 WEST 89TH STREET

AGENTS
CRAWFORD CARS
"MOTOR" CARBIDE
CONTINENTAL-ERIE TUBES

AUTOMOBILES
RENTED
STORED
REPAIRED

NEW YORK., March 17, 1906.

Duplex Ignition Co.,
1555 Broadway,
New York.

Gentlemen:

We wish to congratulate you upon the success your spark plug attachment is giving. We have demonstrated it to not only ours, but to our customers' satisfaction, and would thank you to send us 2 dozen more of these attachments at your earliest convenience.

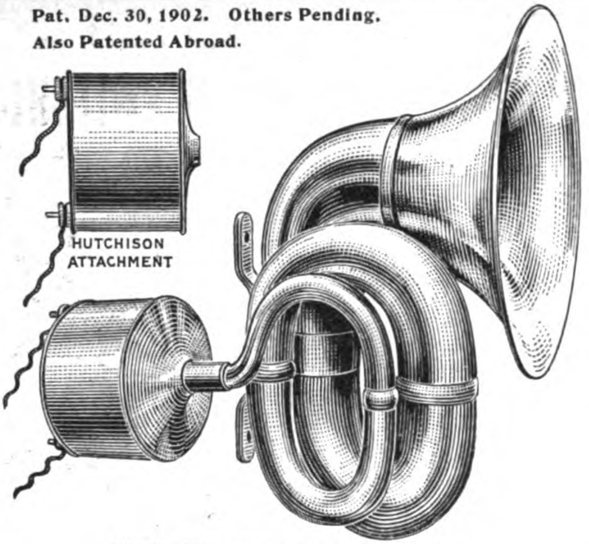
We gave one particularly hard test last week, which proved successful. A spark plug which had been thrown away long ago being unfit for use was put in a car, and after running the engine for several minutes to make doubly sure that it would not ignite on that cylinder, we put on your attachment. It cleared the plug off, and added another customer to your list.

Wishing you every success, we are

Yours very truly,

Joseph Trowell
Secy.

Pat. Dec. 30, 1902. Others Pending.
Also Patented Abroad.



HUTCHISON ATTACHMENT AS APPLIED TO ANY STANDARD HORN

HUTCHISON
Electric Horn
Attachment

The harder you press the button the louder it blows.

Not affected by dust, water, jarring or tampering.

Adjustable to any note desired

Operated by four or six volts of any kind of battery.

Push buttons located on steering wheel, floor, or arm of any seats if desired.

It does not flood you with melody unless you want it so adjusted, but it certainly

Clears the Road

in a nice polite way that means business.

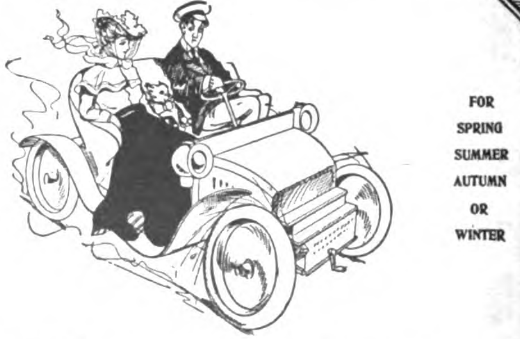
When someone tries to sell you a cheap imitation, make him blow it out of doors. Anything will make an impression inside a house. Don't be deceived into believing that any horn will blow loudly enough until you try it. Our attachment delivers the goods, and keeps on doing it.

Hutchison Electric Horn Co., No. 1. Madison Ave., New York. Phone {5720 574 GRAM

RILEY "Auto" ROBES

THE ONLY ROBES
that harmonize with the Automobile
and the only ones in keeping with "Smart" Outfits

WIND-PROOF
DUST-PROOF
WATER-PROOF
OIL-PROOF
ACCORDING
TO SEASON



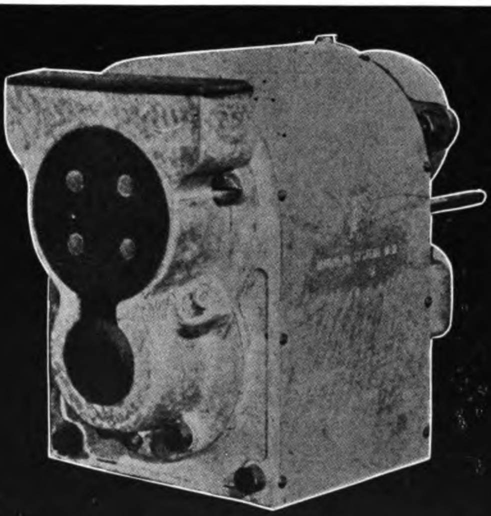
FOR
SPRING
SUMMER
AUTUMN
OR
WINTER

Forty Styles and Prices Illustrated Catalog on request

WM. B. RILEY & CO., *Makers*, PHILADELPHIA

"Riley Robes are Right"

LÉON
RUBAY
J. LACOSTE & Cie PARIS
LUMEN
LEON RUBAY U. S. AGENT



The **LACOSTE**

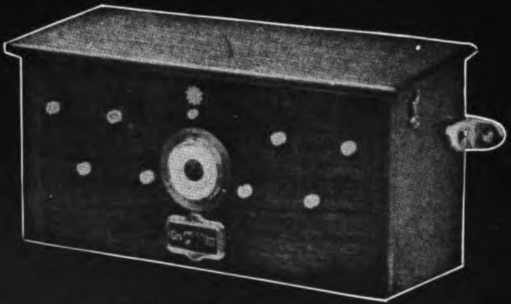
HIGH TENSION MAGNETO

is the most complete device of its kind obtainable: no separate coil, no separate commutator: the accompanying cut shows the Magneto in its entiretv. The Lacoste Magneto is forming part of the equipment of the leading American and Foreign Cars.

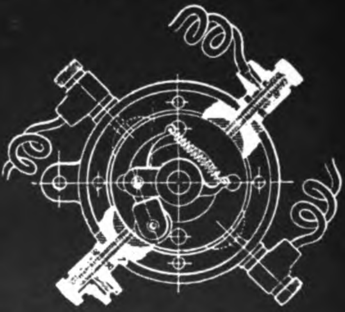
Write for Complete Catalogue **LÉON RUBAY,** 140 West 38th St. NEW YORK CITY

BOSTON—Léon Rubay, 226 Columbus Ave. Sole Agency for New England MICHELIN TIRES
CHICAGO—Franco-American Auto Supply Co., 1404-1406 Michigan Ave.
PHILADELPHIA—Rob't. H. MacKinney, 1437 Vine St.

LÉON
RUBAY
J. LACOSTE & Cie PARIS
LUMEN
LEON RUBAY U.S. AGENT



Lacoste Coils run on four volts, the most reliable induction coil made in the world. The highest tributes that can be paid to its excellence are the vain attempts of other coil manufacturers to duplicate it. The trade mark of J. Lacoste & Co. is on every genuine Lacoste coil.



COMMUTATORS

There are no "troubles" attending the LACOSTE Commutator: it insures perfect contact, and there are absolutely no parts that can get out of order.

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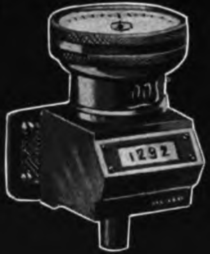

THE "OS"

Odometer Speedmeter

SCIENTIFICALLY ACCURATE

MAGNETIC, positive, steady indication of speed.

TOTALS the distance up to 10,000 miles and repeats.

INVISIBLE TRANSMISSION from driving shaft by means of 2 pulleys and coil-belt.

No shafts hanging dangerously loose around the steering apparatus on front wheel.

5 Models: 20, 40, 60, 80, 100 Miles.

PRICE: $65.00

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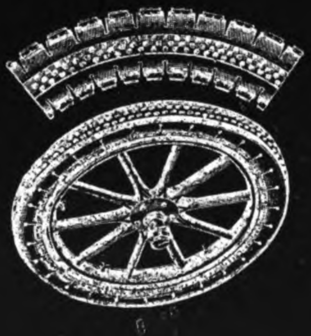

:: :: THE :: ::

Durandal Tire Protector

is made of the best quality of Chrome leather, reinforced at tread and studded with hardened steel rivets, it can be readily fitted to any detachable tire, new or old, thus rendering it

Anti-Skidding and Non-Puncturable...

Save 20 per cent. of your tire bills.

Write for Complete Catalogue **LÉON RUBAY,** 140 West 38th St. NEW YORK CITY

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Trade Printed Matter

mler Mfg. Co., of Long Island City, N. Y., are tising the American Mercedes car which they manu- re, by the publication of a neat little monthly maga- called the "Autocrat." This little magazine is of t size but has condensed within its limits a lot of written information about the car which it advertises.

Bullard Automatic Wrench Co., 257 West Exchange Providence, R. I., have, in their latest booklet adver- their Bullard automatic wrench, a fine piece of ogue work. The method by which the Bullard grips ened to the gripping effect of one's hand and by a osite illustration of a human hand and the Bullard ch they impress this feature very strongly on the r's mind. A number of other clever illustrations the Bullard wrench in various positions illustrating ide range of usefulness.

Henry & Wright Mfg. Co., 111-137 Sheldon St., ford, Conn., illustrate in their latest catalogue a number of ball bearing drill presses and filing ma- s, many of which are, no doubt, of interest to this .

the "Reo Echo," published from time to time by Reo Motor Car Co., of Lansing, Mich., a large nt of information about motor cars in general and the Reo motor car in particular is set forth in and readable form. The first copy issued in Febru- contains 32 pages and cover.

booklet describing the Reece screw plates in detail lately been issued by the E. F. Reece Co., of Green- Mass. The cover of the book represents the outside screw plate box showing the grain of wood plainly the pages inclosed are devoted to the explanation e style and construction of the Reece taps and dies, al cuts being used to illustrate these products.

s-Bright Mfg. Co., 245 N. Broad St., Philadelphia, issuing a series of cards illustrating standard methods oying Hess-Bright ball bearings. For example, one before us bears an illustration of the Hess-Bright bearing rear axle worm drive taken from the Dennis bus. Another contains an illustration of the De- y-Bellville speed change gear and bevel drive, which so Hess-Bright ball bearing.

80-page book containing illustrations and specifica- of gasoline automobiles manufactured by members e American Motor Car Manufacturers' Association, models, has lately been issued by the association, e office is in the Marquette Building, Chicago, Ill. booklet is of such size that illustrations of fair pro- ons can be used in connection with fairly ample fications, so that a very excellent idea of the general ruction and appearance of each car can be obtained e reader and sufficient knowledge gained to enable to know which would be likely to interest him. The is tastefully gotten up and well printed on good .

e Guide to Safety" has lately been issued by the Speare's Sons Co., of 369 Atlantic Ave., Boston, ., being a small booklet containing advice as to ation, to set forth in particular the merits of re's various lubricants, which include cylinder and ine oils and greases. They also manufacture auto- e soaps, metal polishes and cotton waste, prices of are given in the booklet.

arris" oils are very well advertised in a booklet tly issued by the manufacturers, A. W. Harris Oil 326-28 S. Water St., Providence, R. I. The title contains this statement in reference to Harris oils: ittle goes a long way." This suggests economy, and pages following bring out the quality of Harris oils convincing manner.

S. Sheppard, 21 Lawrence St., Newark, N. J., manu- rer of the "Ideal" oils, has just issued a 16-page et exploiting this line. A feature of the booklet is ertation on the history and origin of petroleum, its ic origin and its uses.

excellent wearing qualities of Diamond tires are ht to the front by a booklet recently issued by the facturers, Diamond Rubber Co., of Akron, O., enti- "A Million Miles of Diamond Tires." The fact is ht out that the combined mileages of a selected er of users of Diamond tires amounts to over a n and that the average mileage has been found to trifle over 7,154. The mileage of one user exceeded .

very handsome catalogue has been issued by the ell Motor Car Co., of Racine, Wis., advertising 1906 cars. The reading matter is interspersed with y illustrations of cars in attractive settings and a illustration of each model is also shown in connec- with a summary of its specifications. Detail illus- ons show the fine finish and excellent construction portant parts.

Motor Guide League, with headquarters in Detroit, ., and Chicago, Ill., have issued a guide book for mobiles compiled by Sydney J. King, a well-known roads advocate, who has personally gone over the s and has given his entire time and attention to work. The book contains the usual information given ute books and the publishers offer to furnish addi- l information by correspondence to any purchaser of book who desires the same. This book lists at $2.00.

American Motor League, Vanderbilt Bldg., New , have issued in book form a series of articles on dside Troubles," written by Chas. E. Duryea. As d on the cover page, it is a "budget of hints, and for the selection, management, care and economical tainance of a motor car." The fact that the infor- n is from the pen of Chas. E. Duryea makes remarks its usefulness unnecessary. The book lists at $1.00 per copy, but members of the American Motor League are furnished with copies free of charge.

Buob & Scheu, of Cincinnati, O., manufacturers of bodies for automobiles and other vehicles, have taken a unique method of advertising their business, having lately issued copies of a song entitled "She Loves You as Long as the Other Fellow's Not Around," enclosed in a cover containing advertisements of their bodies. Words and music are both given and this enterprising firm are making a liberal offer in agreeing to send copies of this song entirely free of charge to any readers of this paper who will ask them for the same.

Hyatt Roller Bearing Co., of Harrison, N. Y., who from time to time issue bulletins treating of Hyatt roller bearings as applied to special requirements, have lately issued their Bulletin No. 26-B, which deals with the Hyatt roller bearing as applied to the motor car. Like previous bulletins issued by this concern the subject is exhaustively treated in a thoroughly efficient manner and the bulletin is worthy of perusal by every one interested in the motor car,—users, manufacturers and dealers.

Olds Motor Works, Lansing, Mich., have issued a booklet of testimonial letters entitled "What They Say." A conspicuous and amusing feature of this booklet is the method of illustrating each page by pen and ink sketches of the Olds in various locations, the illustration in each case showing the car driven by a person supposed to be the writer of the testimonial letter above it. The design of the car in each case is suggestive of the business or profession of the writer of the testimonial letter. This unique method of illustration makes reading of the testimonials rather interesting and prevents the reader from tiring of constant perusal of one style of literature, as might be the case were there no pleasing illustrations.

In a very attractive booklet recently issued by the Olds Motor Works, of Lansing, Mich., illustrating the trip in an Oldsmobile "From Hellgate to Portland" (the words in quotations comprising the title of the booklet), some originality has been shown in the placing of the illustrations, most of which are at the tops of the pages extending to the top and side edges of the pages with no margins surrounding them. The illustrations and the reading matter both serve to make a strong impression upon the reader of the almost insurmountable difficulties which were met by the Oldsmobile in its trip across the continent.

The advertising of castings being a somewhat difficult matter, makes the booklet recently issued by the Light Mfg. & Foundry Co., of Pottstown, especially interesting because this booklet deals with the subject of aluminum castings in an instructive way, and its excellent illustrations and attractive makeup catches the reader's interest. The booklet contains some very useful information and is altogether a very good advertisement of very good castings.

Harry R. Gear Co., St. Louis, Mo., have lately issued their 1906 catalogue of motor cycles and motor cycle specialties. This catalogue contains 48 pages and cover, and in it are listed a wide variety of motor cycles, parts and accessories.

B. S. Clark & Co., of Providence, R. I., issue a booklet called "Who It Is," being an automobile directory of Rhode Island. This directory is published monthly from March to November, giving all exchanges, cancellations and additions up to the first of each month. The price is 15 cents per copy.

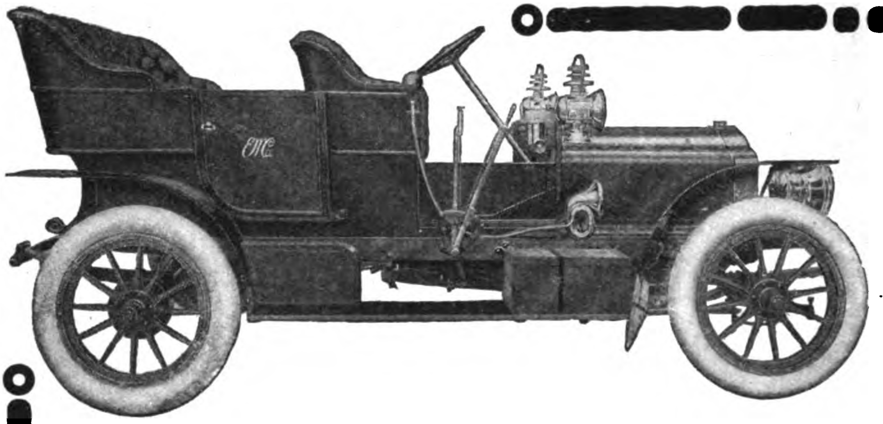
Melrose Automobile Co., 153a W. Emerson St., Melrose, Mass., have taken advantage of the Marriott victory with the Stanley steam car at Ormond to call attention to the fact that the Stanley car is equipped with the National kerosene burner which they manufacture. They have issued a booklet fully describing the burner and containing a summary of the Stanley car's wonderful accomplishments at Ormond.

The Columbia Lubricants Co. of New York, 78 Broad St., New York, have issued a unique calendar for 1906 which may be properly called a Vanderbilt Cup race souvenir. It contains pictures of Hemery and Lancia and an illustration of the Vanderbilt Cup. It also contains facsimile reproductions of letters written by Hemery and Lancia, stating that they used Columbia Lubricants Co.'s Monogram lubricants on the cars which they drove in the Vanderbilt Cup Race. The illustrative scheme also includes an outlined map of the cup race route. In one corner appears a statement to the effect that sixteen of the twenty cars entered used Monogram oils.

The Standard Welding Co., of Cleveland, O., have lately issued several booklets, each dealing with a special department of their business, one on steel rings, one on steel tubing, one on seamless steel rims, and one on electric welding. These booklets are up to the usual standard set by this company in its advertising literature and very forcibly present the claims they make for their high grade products and work.

Eclipse Machine Co., of Elmira, New York, are furnishing bicycle dealers with an attractive hanger to advertise the Morrow coaster brake which they make. This hanger is gotten up in such form as to attract attention and make a strong impression as to the good points of the Morrow brake.

The Manufacturers' Foundry Co., of Waterbury, Conn., have gotten out a new booklet advertising their cylinder castings for the automobile trade. It contains a number of views of their plant which impresses one with the magnitude of their business and the completeness of their facilities. The last illustration in the book shows their employees massed in front of one of the buildings and firmly clinches the impression made of the bigness of their business. Not very much is said about their business in this booklet, but a smaller booklet accompanying it gives plenty of information about their foundry methods and contains illustrations of intricate work which they have cast.



The Two-Cycle
ELMORE

"Put a Strong Heart to the Steep Hill"

The two-Cycle in practical results is as strong up hill as on the level road. The explanation of the two-cycle principle is as simple as human breathing. It is merely a uniform, unbroken application of power—something which is a physical impossibility in the four cycle.

If you want to understand this clearly send for "The Heart of The Man and the Machine."

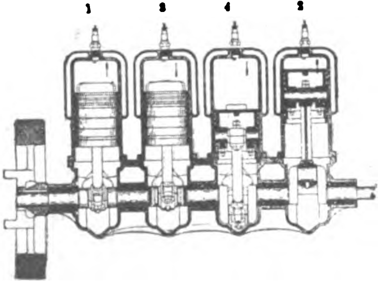
Study This Diagram—it's important

Cylinder No. 1—Explosion has forced piston half way down.
Cylinder No. 2—Just starting down from explosion.
Cylinder No. 3—Coming into action before force of explosion in Cylinder No. 2 is exhausted.
Cylinder No. 4—Will come into action when piston of cylinder No. 3 is half way through.

A Single Fact is Worth a Shipload of Argument

The single fact we wish to impress upon you is that the Two-Cycle Elmore is the most economical car made. From 18 to 20 parts on every cylinder eliminated. Actually 50 per cent. of working parts eliminated. All inlet and exhaust valves entirely done away with.

The two-cycle car goes anywhere without change of gear; always a steady unbroken application of power. Can be throttled down on the high speed to two miles an hour or speed along at the rate of 45 miles; will climb steep, diffcult grades without strain or effort.



Send for Illustrated 1906 Catalog.

The Elmore Mfg Co.

904 Amanda Street, - CLYDE, O.

Members Association Licensed Automobile Manufacturers.

MECHANICAL AND TECHNICAL Department

EDITORS.

Gasoline vehicles—Chas. E. Duryea, Duryea Power Co., Reading, Pa.
Steam vehicles—J. A. Kingman, Locomobile Co. of America, Bridgeport, Conn.
Motor cycles—Chas. H. Metz, Waltham, Mass.

(We desire our readers to make full use of this department by asking our department editors for advice on all subjects connected with automobiles. We will also grant full use of our columns to those who disagree with the views and opinions expressed in this department.)

NOTICE—Matter for the attention of the Editors of this department should be addressed to the particular editor it is intended for, care of the Cycle and Automobile Trade Journal, and must reach Philadelphia by the 10th of the month to insure insertion in the next number.

Gasoline Vehicles

CHAS. E. DURYEA.

INCREASED COMPRESSION OVERHEATS.

New Bedford, Mass., February 20, 1906.

A 1905 4-cylinder touring car not developing hill climbing power satisfactorily, the owner had the heads of the pistons crowned up to an even oval, thereby I understand increasing the compression, the consequent result being increased power. The valves were not changed. Now the engine heats to the boiling point. Why is this, and is the result any different than would be produced by increasing the length of throw with a new crank shaft, the stroke on which would carry the piston same additional distance as the piston heads are built up?

Is there a sliding gear or planetary transmission on the market that drives from the engine underhood to transmission under body of car (20 horse power) by chain? The car is a double chain drive to rear wheels with a differential in the transmission. Same composed of chains and sprockets.

H. E. B.

Increasing the compression gives higher working pressures with consequent increased temperature of the gases, which, of course, heats the walls hotter. The higher pressure will give you more instantaneous ignition and in some instances pre-ignition. This more instantaneous combustion and ignition is one of the advantages, as well as one of the reasons for the increased power. On the other hand, the overheating, the greater strain on the bearings, and the more perceptible shock of the impulses are the objectionable features. Building on the head of the piston gives the same result that setting the crank bearings closer to the cylinder head would do. Increasing the length of connecting rods would give the same result. Increasing the crank throw would lengthen the piston stroke, draw in more charge and give more power because of the increased charge which is a different result. I do not recollect any vehicle on the market with transmission as stated. This is not an uncommon expedient, however, where but a single rig is being constructed.

C. E. D.

VALVE SIZE AND LIFT.

Oswego, N. Y., February 27, 1906.

The engine in my car is a 5 x 6 horizontal motor automatic inlet. It does not seem to develop its rated power, 7 H. P. It will not take the least grade on high speed at times. It will not run more than 7 hours before it gets the water boiling, of which there is a 6 gallon tank. There is a circulating pump on engine. It never seemed to have much power to it. Will you kindly let me know what the diameter of exhaust and inlet valves should be, also the lift of the same. How many pounds compression should it show, and how long should it hold it. What power should a 5 x 6 develop at 500, or 750 or 100c R. P. M.?

I am designing a 4½ x 4½ 2-cycle 2 cylinder, 3 port. Inlet to crank case is ¼ in. high and 2¼ wide; transfer port is 9-16 high, 3½ in. around cylinder, exhaust ⅞ high 4 ins. around cylinder, compression space is 1½ ins., what power should I get out of this engine at 650 R. P. M. at 800 R. P. M. at 1000 R. P. M., what is the speed limit of the ports of this engine? Hoping you will kindly give me your valuable advice on the above and oblige.

P. J. E.

The exhaust valves should be 1-3 the cylinder bore and should lift about 1-5 their own dia. They should be opened 20 to 30 deg. ahead of dead centre and remain open until the next dead center. Such an engine should give 8 H. P. at 750 revos. per minute and nearly proportionate power at the other speeds. If you will read the last year's issues of the Journal, you will find the information asked for more fully than it can be given in this answer. Make the exhaust port ¼ the length of the stroke, the transfer port 1-6 and the inlet port to the crank case ⅛. The exhaust and transfer ports should not come close enough together to permit leakage from one to the other around the piston side. A two cycle engine ought to give a little more power than a four cycle of the same size. You ought to get 5 or 6 horse per cylinder if everything is right, but two cycle engines are hard to get and keep right.

C. E. D.

ENGINE STARTING DEVICE.

Bangor, N. Y., February 19, 1906.

I am about to try an experiment on my Pope-Hartford Model B car, and would like your opinion as regards its satisfactory working. I am anxious to put on some arrangement for starting my car after short stops (such as meeting teams which are very "scary" up here) without having to get out in the mud and crank the engine. In my Pope-Hartford the crank shaft runs crosswise and about mid-way the car, the balance wheel being one side of center. The wheel is about 20 in. in diameter with a 3 in. flat faced rim. I propose building an idle wheel about 12 in. in diameter, of about 30 pound weight, put it on a 1 in. steel shaft 12 in. long, with a 4 in. leather faced friction pulley at one end of shaft, both wheel and pulley keyed to shaft, with shaft on ball bearings hung to frame of car, with hanger like a belt tightener hanger, and arranged so as to swing towards balance wheel of car, bringing friction pulley in contact with rim of balance wheel on engine, the friction to be applied and released by a foot pedal. Upon making a short stop one could press down on pedal, bringing friction pulley to rim of balance wheel, putting the idle wheel in motion which would run a long time on its ball bearings, and could be brought into contact with rim of balance on engine again when ready to start the car, then let off the balance and remain idle until wanted. The balance wheel is 20 in. in diameter and runs at

900 R. P. M. The friction pulley on idle wheel is 4 in. in diameter, and if held in contact until full speed was attained, would run about 4500 R. P. M. I do not think it would be necessary to run the idle wheel more than one half that speed to have it start the engine after stopping ten or fifteen minutes. The reason I use a 4 in. friction is to have the power when applied to balance. If I have made it plain enough to you so you can give me your opinion as to its "doing the business," I should be pleased to have you do so. W. H. ARNOLD.

Your suggestion for an extra fly wheel starting device will undoubtedly work for short stops just as we assured the inquirer in last number who proposed to release and use the regular fly wheel for this purpose. In fact, your device seems the best of the two and its only objection is the size and weight of the wheel required. It would seem advisable to to fit a strap around the regular fly wheel in such a position that you can cause it to grip the fly wheel and permit you to turn the engine over by pulling on the strap when you sit in the seat, or some similar arrangement of this kind. One or more vehicles in the past have been fitted with ratchet pedals by which the operator would turn the engine over, and a number of them have had ratchet cranks brought within reach of the operator. The self starting problem is not an easy one and will probably not be solved for some time to come. Considered as a problem it becomes more difficult as engines increase in power. A light vehicle with a small engine is easily started by hand. Improved carburetors and multiple cylinders, however, are making starting easier, and the gasoline engine may yet become as automatic as a steam engine. C. E. D.

SHORT OF POWER.

Osage, Iowa, Feb. 26, 1906.

I have a car with one 4½ x 6 in. cylinder. I don't seem to have quite enough power. There is a space of about two inches between piston and cylinder head. I thought of riveting a circular plate about ½ inch thick, on piston so it would give me more compression. I also thought I would take the carburetor off and put on a Universal carburetor. ROBERT ANDERSON.

We would not advise changing the compression on your engine. A high compression throws more strain on the parts and may cause premature ignition. You doubtless have all the speed you want anyhow, and high compression will not give you much greater power, if any, at any given speed until the speeds get quite high. Whether changing the carburetor will do any good or not, is a matter of experiment. The Universal carburetor is a good one, but it is quite likely that equally good results can be had from the one now on the vehicle if it is in good order. C. E. D.

VALVE OPERATION AND FRONT DRIVE.

Brooklyn, N. Y., February 22, 1906.

There seems to be disinclination on the part of manufacturers to place the valves on opposite sides of the cylinder because of the necessity of two cam shafts. My idea is to use one cam shaft and one walking beam, the valves to be placed in the head of the cylinder. Between the valves a supporting bracket bearing a walking beam with suitable bearings to operate the valve springs on each side in succession, a push rod operating the beam. I have never seen this method used and see no objection to it.

Another idea as to the transmission of the power is this: The drive through the front axle, and the engine under the hood. Live axles in the front one with two separated skew bevel gears attached by clutches to the differential. The engine shaft extending midway between the two bevel gears on differential with two skew bevels (with clutches) to mesh with those on axles. This means that one gear on engine shaft be in rear of the axle; the second forward. The speeds of course would be governed by the teeth in the gears. Two speeds would be obtained and reverses easily fitted. I think about 10 per cent. more power could be obtained at the wheels, not to speak of other advantages. G. H. F.

There are many methods of doing almost any mechanical act. The walking beam idea is not new, although I do not remember who uses the constructiion which I understand you tto describe. If you are designing an engine and this arrangement seems to be most advantageous, my advice is to adopt it. Do not, however, waste any money trying to patent it unless you can persuade others to adopt it. Such things are too common and patents can only be secured on details. Detail patents are practically unsalable and are usually worthless except to protect certain features that one may for special reasons wish to preserve.

The front drive is the logical outcome of the motor front position and electric cabs are now being used which propel and steer the front wheels. For

CARBON FORMATION ON PISTON AND CYLINDER.

Creighton, Neb., February 17, 1906.

I don't see how any one who drives a car can get along without the Trade Journal; one certainly can get pointers enough to balance the price of subscription. One thing I have been looking for, but don't see much trouble over, is carbon formation on piston heads and combustion chamber. Now with my car this is all that has bothered me to any extent in the two years I have run my car. I buy the best grade of cylinder oil, and feed what I find is right for the best operation of the motor, but after about two or three months driving the motor begins to show signs of pre-ignition, and if crowded on a hill will pound like a fiend, the only remedy is to take every last cylinder off and scrape the deposit off, which I find in a granular formation on the side next exhaust ports. The points of these carbon granules show signs of having been red hot. Now this must be the cause for after removing it you can't make the motor sound by crowding it on high gear in sand or on steep grades, and the power is increased to a noticable extent.

I have tried every way to avoid this trouble, even to changing carburetor from a Shebler to a Holly and back again, but found no difference. Of course, I cannot get a uniform grade of gasoline here, buying it from Standard Oil Company's wholesale tank wagon, but I can't see that the fuel has much to do with it. There is one grade in particular from our power house to town which averages 15 per cent., and is sandy in places. Now my car will sail up this grade with most any old gasoline provided the cylinders are clean, but with carbon on cylinders I can hardly make it on low gear. Now if any one knows a remedy for this they will confer a great favor on several people who are bothered this way besides myself. FRED. C. LARGEN.

Carbon in cylinders is usually caused by the use of a lubricating oil which burns in place rather than evaporates. The lighter oils will usually boil away, just as does water or kerosene, but the heavier oils containing considerable carbon frequently carbonize, leaving a very perceptible deposit. This carbonizing effect is different under different circumstances. For example, gasoline seldom or never leaves a carbon deposit except occasionally in the form of a light soot. Kerosene will, under certain heat conditions, "crack" or separate into its carbon and hydrogen constituents and leave the carbon as a deposit, which is one of the things that causes trouble in kerosene generators. The only thing to do is to test various lubricating oils until one is found least affected by the particular conditions in your engine. If the carbon deposit is present it must be removed by scraping as you quite rightly suggest. C. E. D.

HOW TO FIGURE H. P. FLASH POINT OF GASOLINE.

Philadelphia, Pa., February 22, 1906.

What is the shortest way to figure H. P. of gas engines by bore, stroke and revolutions, also at what temperature does a tank of gasoline become dangerous; what is its flashing point? SKIP.

The maximum H. P. that you may expect can be roughly obtained by squaring the bore of the cylinder and dividing by 3. This is figured at 750 ft. piston speed per minute. Proportionate piston speeds will give roughly proportionate results. Gas engines vary quite a little individually, so the result of a formula is only an assistance to guessing in any event. Gasoline flashes at about zero Fahrenheit. If on a real cold day in the Winter time you spill some on a piece of iron outdoors and attempt to light it with a match, you will find that it will not light if the temperature is below the flash point, but behaves as does kerosene ordinarily. The boiling point varies with the density as does the flash point. A gasoline tank is not dangerous in the sense that the contents are explosive, for gasoline is not explosive and will not burst the tank unless it is boiled, when it will behave just as does water. If the tank is open, gasoline vapor may be found issuing from it in small quantity at ordinary temperatures and a lighted match at the opening will ignite the vapor, which will burn with a slow yellow flame. The hotter the gasoline, the faster it will vaporize, so the larger the flame will be. The danger with gasoline is from fire, not from explosion. It ignites easily because its vapor is always floating about unless the temperature is below the flashing point, and if this vapor is mixed with air in a closed room, the mixture may be explosive, converting the room into a gas engine, with the result that the windows or even the sides of the room may be blown out and much damage done if the mixture is ignited.

C. E. D.

WHERE IS E. K., CLEVELAND, OHIO?

466 Waverly Ave.,
Cleveland, O., Feb. 24, 1906.

The writer by chance read an article in The Cycle and Automobile Trade Journal on Gasoline Vehicles by C. E. D., the inquiry—Cleveland, O., Dec. 20, 1905, signed E. K. The writer would like to meet or communicate with E. K. in regard to engine construction, having had 15 years of field practice and am just about in shape to make a change; capable of position as general erecting engineer and builder of power plant. My aim is to start in with a booklet on general troubles on internal combustion engines, stationary, automobile and boat, do you think there is a good field for such a booklet practically? Yours truly,

R. H. BARTEL.

We haven't E. K.'s address or we would gladly send it. Possibly he may see this letter. There is undoubtedly a field for a variety of books on the auto subject. The business is growing so rapidly that thousands of people must be educated.

C. E. D.

FAULTY MIXING DEVICE.

Haverhill, Mass., February 17, 1906.

I am repairing a freak engine with an oscillating cylinder, four cycle, two fly wheels, and I never saw anything like it before. The only thing gained seems to be a chance to oil the wrist pin, which in this case is on top of the cylinder. I have got it running alright, but have to heat about 6 in. of ¾ pipe running from a poor mixing valve to intake valve which I intend to try to do away with. After it is started it will run without any heat. Will that be a good remedy?

S. IRVING NOYES.

It seems that your mixing device is faulty in that it does not give an explosive mixture at the speed possible by hand. Substitute a good carburetor or decrease the air opening at the spray nozzle during the starting operation. The application of heat vaporizes the liquid which vapor mixes with the air and this permits an explosive mixture to be formed, and thus enables you to get started, but the mixer ought to deliver an explosive product without this trouble.

C. E. D.

2 CYCLE ENGINES.

Galveston, Texas, Feb. 28, 1906.

What are the principal objections to a 2 cycle

Will a 2 cycle engine (say a first-class make), say 5x5 inches, develop more power than a 4 cycle of equally as good a make, if so, about what increase in power would there be?

If a 2 cycle engine could be constructed so that its cylinder could be entirely cleaned of burnt gases after each explosion, and it could be supplied with a mixture equally as explosive as a given 4 cycle engine of the same size, would the 2 cycle develop twice the power?

What is the pressure in lbs. of an ordinary 2 cycle engine in the crank case at its highest compression?

What is the highest amount of compression in lbs. in firing chamber usually gotten out of a 2 cycle engine just before the explosion takes place? Also what is it in a 4 cycle?

To increase compression will it increase H. P., if so, in what proportion?

What is the highest point of compression in lbs. which can be used up to the point where premature ignition takes place in an ordinary water cooled motor, also in an air cooled motor?

E. H. LABODIE.

It is generally admitted that two cycle motors are not so reliable, so flexible nor so economical as the four cycle motor. There are two chambers to be kept tight, the crank chamber and the cylinder proper, whereas the four cycle has only the cylinder. Valves can be ground, but bearings are harder to keep in order and leakage in the crank case interferes with the operation. A good two cycle will give one-fourth to one-third more power than a four cycle motor of same size, but most aeronautic and light high power launch motors are four cycle, in spite of the fact that the average launch engine is two cycle.

The two cycle engine cannot develop "twice the power," because the stroke after the exhaust port is closed is not the full length as it is in the four cycle. The power, however, under the conditions supposed should be proportionate to the comparative stroke lengths or charge volume. The usual pressure in a crank case is but three or four lbs., but some builders have used compressions as high as 12 lbs. The cylinder compression before ignition is a matter of construction, and may be high or low, according to the ideas of the designer and the size of the firing space. Auto engines probably average 60 to 75 lbs. This point is rather uncertain, because no two people measure the pressure under the same condition and no two engines are equally tight or equally hot when tested.

Increased compression does slightly increase the economy. It also increases the strength required in the parts, the weight of the fly wheel and the difficulty of cooling. A high compression engine must be kept cooler than with low compression, so where there is some gain there is also some loss. I believe that in auto practice the low compression engine of large size, lightly constructed, will be found more advantageous than a smaller engine of stronger construction with more cooling difficulties and more vibration. The premature ignition point depends so much upon the cooling and the design of the motor that this question cannot be answered, so as to be of any value to you. Almost any engine built can be worked hard enough to ignite prematurely, particularly if there happens to be a little carbon in the cylinders. Carbonization is almost impossible to prevent, and the low compression engine simply needs cleaning less often because of carbonization. In short, it is the engine that will stand most everyday service of the usual kind.

C. E. D.

At the annual meeting of the Lowell Automobile Club, of Lowell, Mass., it was unanimously voted to join the American Automobile Association. The following officers were elected: President, H. E. Fletcher; vice-president, Dr. M. W. Jones; secretary, E. P. C. Cheney; treasurer, W. H. Green.

An automobile flower parade was held in Mobile, Ala., on February 27, and there were a number of prettily decorated cars in line that twice circled Bienville Square. First prize of $100 was awarded to Mrs. William F. Tebbitts, who drove her own car decorated with tiger lilies.

The Camden Automobile Association is the name of a new club that has been formed in South Jersey. S. W. Sparks is the president, H. G. Hollinger, secretary, and John T. Dorrance, treasurer. The club was organized to promote sociability among automobilists generally and to seek to improve South Jersey roads.

May Edition

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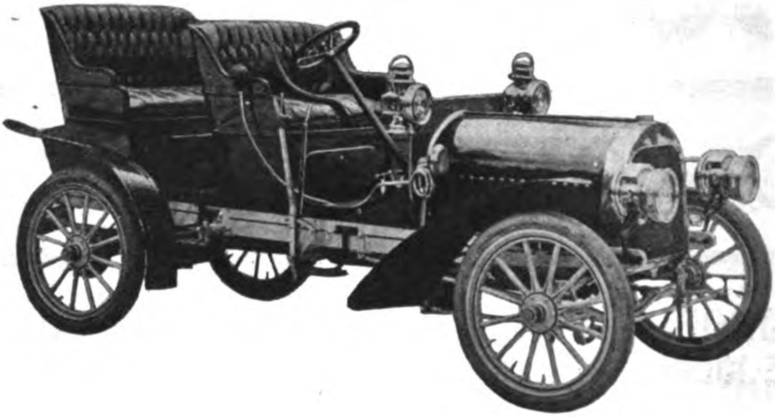
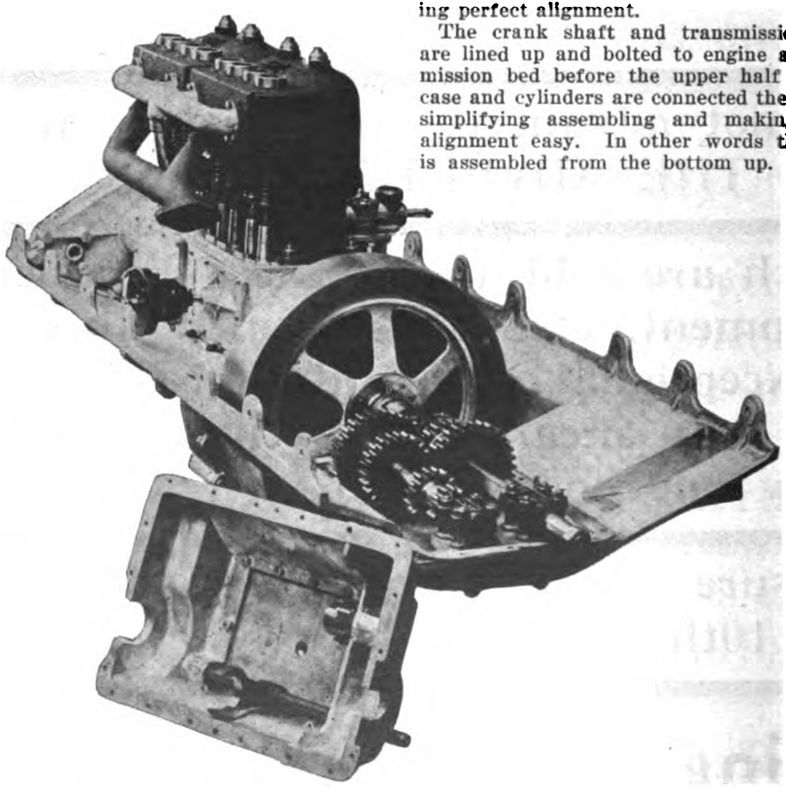
The "Mora" Gasoline Car

S. A. Mora, 317 Livingston Bldg., Rochester, N. Y., is now on the market with a 24 H. P., 4-cylinder, gasoline car which he has been developing for some time. This car is furnished in runabout form at $1,650, or with an additional surrey seat at $1,775. One of the most noticeable constructional features of this machine is the aluminum bed on which is placed the engine and transmission. This bed extends from the front end of the engine to the rear end of the transmission and forms a dust proof protective pan.



"Mora" Gasoline Touring Surrey; 4-cylinder vertical, 24 H. P., 3 15-16 by 5¼ engine under hood; jump spark ignition; water cooling; sliding gear transmission; 3 forward speeds and reverse; shaft drive; tread 56 in.; wheel base 96 in.; tires 32x3½ in.; clinchers; weight 1700 pounds; price $1775, including surrey seat, oil tail light, oil side lamps, horn and tool. Without surrey, $1650.



Three-quarter rear end view of "Mora" Engine and transmission, all on one aluminum bed, which forms a dustproof protective pan extending from front end of engine to rear end of transmission.

The marine type bearings which are used for crank and transmission shafts are made to jigs, therefore interchangeable. The journal bed of both engine and transmission bearings is machined in one operation, this in connection with the jig made bearings insuring perfect alignment.

The crank shaft and transmission shafts are lined up and bolted to engine and transmission bed before the upper half of crank case and cylinders are connected thereto, thus simplifying assembling and making perfect alignment easy. In other words the engine is assembled from the bottom up.

In assembling the car, the engine and transmissions are placed in position as one

Automobile Frame Steels

If you **must** economize, do it somewhere else than in the **foundation** of your Automobile. No Motor Car is stronger than its frame and the money expended to make sure of this particular specification returns large dividends in safety and satisfaction. We make more Automobile Frame Steel than any other one plant in America and have learned that a **good** Frame Steel is produced only with great care in every detail of manufacture and treatment from the time the ore leaves the ground until the finished bars are ready for the frame maker.

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Our regular High Carbon, Cold Rolled Frame Steel is sold under the trade name "ELYRIA." More of this steel is used in High Grade American cars than of all other frame steels combined. For use under most exacting conditions as in Racing cars where maximum strength must be combined with minimum weight we offer our new Chrome Nickle frame steel "MAXMIN" of which we are sole producers.

Some interesting test reports covering these steels are ready for Factory Engineers or Automobile Buyers who investigate such things.

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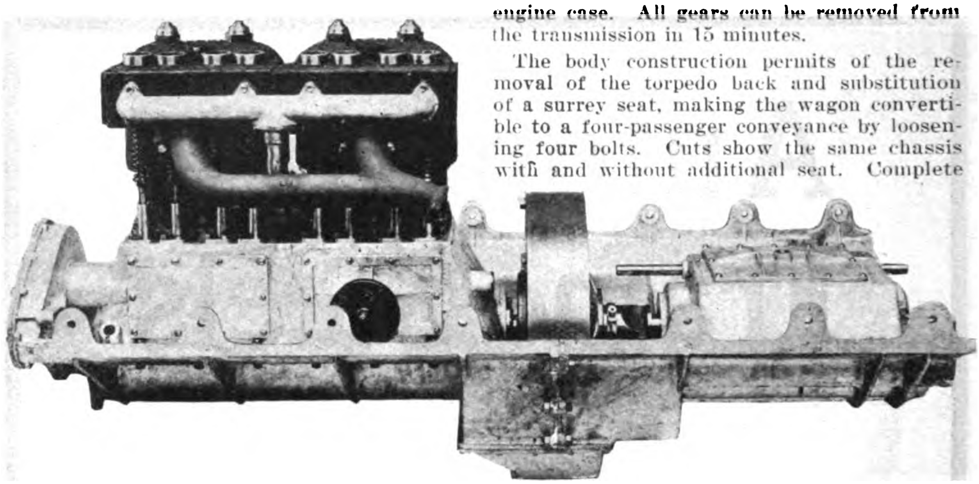
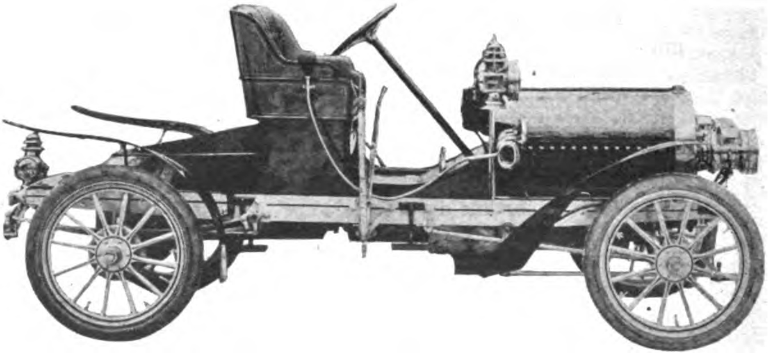


Left side of view "Mora" Engine, and transmission and bed which carries both. Engine is 4 vertical cylinders, 3 15-16 by 5½ in.; 24 H. P.; jump spark ignition; water cooling. Transmission is of sliding gear type, giving 3 forward and the reverse.

unit; there is therefore no chance of crank and transmission shafts getting out of line, as is liable to occur where engine and transmission are assembled in frame as separate units.

The rear platform spring suspension employed not only makes riding exceedingly easy but in addition in connection with transverse front spring brings the points of frame suspension central instead of at corners, and thereby reduces to a minimum the tendency to twist and strain frame when traveling uneven roads.



"Mora" Gasoline Car without rear seat. Chassis same as surrey; price $1650; surrey seat $125 extra.

Spark and throttle levers are located on top of the stering column. Clutch is operated by left foot pedal. There are four brakes, all operating on the rear wheel drums. Two are exterior constricting brakes worked by the right pedal and the other two are interior expanding brakes worked by hand lever.

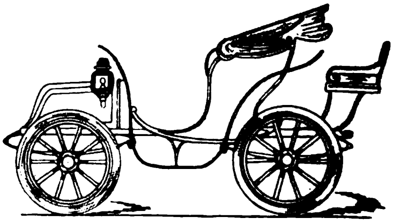
The engine and transmission bearings are of ample dimensions and are made of phosphor bronze. The connecting rod journals are 2⅝x1⅝ in. and the crank shaft journals 4x1⅝ in. The crank shaft bearings are of the same design as those shown on the transmission in the ¾ view of the power assemblage herewith. All repairs and replacements are made from above. Large hand hole plates are provided on both sides of the upper half of the engine case. All gears can be removed from the transmission in 15 minutes.

The body construction permits of the removal of the torpedo back and substitution of a surrey seat, making the wagon convertible to a four-passenger conveyance by loosening four bolts. Cuts show the same chassis with and without additional seat. Complete specifications are given beneath the surrey cut.

"Brunn" Electric Vehicles

James MacNaughton Motor Car Co., 649 Main St., Buffalo, N. Y., are sole selling agents for Brunn Electric Vehicles, made by Brunn's Carriage Works, of the same city. They also handle several lines of commercial electric vehicles.

Three Brunn vehicles are here shown.



The "Brunn" Electric Station Wagon; price, $3500.

The Phaeton Stanhope specifications are as follows: Westinghouse motor and controller; optional steering; direct [illegible] shaft drive; Exide battery; speed, 18 miles per hour; mileage, 50; price, $2500.

The inside driven coupe is also equipped

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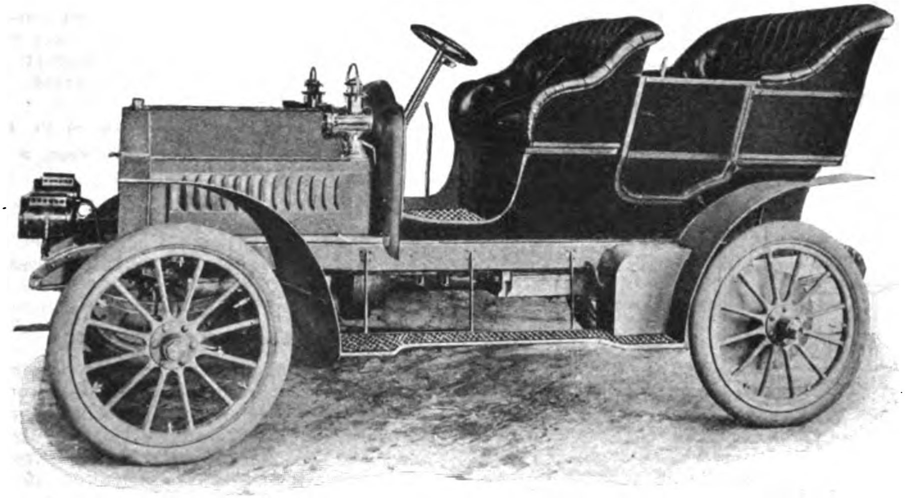


24—28 H. P. 4 Cylinder. Price, $2,000

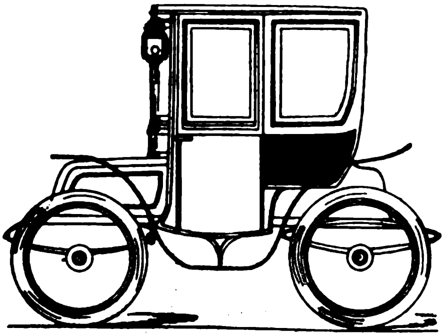
The **Crawford Car** is the only 1906 model of a high-powered, high-grade, four cylinder car selling at $2000. We are able to make the price so favorable because we have the facilities for manufacturing in large quantities. The workmanship throughout is of the highest grade, the general construction is rigid and strong, and all mechanical details have had careful attention, with the result that the **Crawford** will give maximum service with the minimum cost of maintenance. It is capable of climbing steep grades on the high gear, and attains great speed on the level.

It has many excellent new features which are fully described in our catalog. If interested, send for it, or call to see our nearest agent.

Crawford Automobile Co.

HAGERSTOWN, MD.

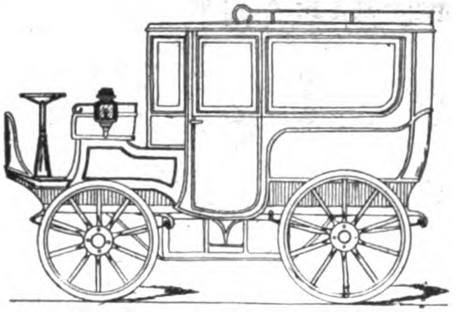
Agents for New York and vicinity, NEW AMSTERDAM MOTOR CO., 152 W. 56th St.



The "Brunn" Inside Driven Electric Coupe; price, $2500.

with Westinghouse motor and controller, and has wheel steer. Other specifications are same as those of the Phaeton.

The Station Wagon has double chain or gear drive, and is capable of a speed of 15 miles per hour. The battery gives 40 miles on one charge. Price of this vehicle is $3500. It has Westinghouse motor and controller, wheel steer, and Exide battery.



The "Brunn" Electric Phaeton Stanhope; price, $2500.

The Pasadena-Altadena Hill Climb

The Pasadena-Altadena hill climb on February 22 was one of the most successful automobile events ever held in Southern California, and the affair was conducted by the local Dealers Association, with H. D. Ryus, chairman of the committee, in charge.

The road used for the climb starts near the outskirts of Pasadena, and goes almost straight north for four miles to the foot of the mountain. The grade for the first mile and a half of the climb is not over 8 per cent. The grade gradually increases until it is close to 15 per cent. at the top. The fastest time was made in the open event by a 58 horse power Thomas Flyer, driven by Frank Seifert. The climb will be made an annual event. The summaries follow:

Runabouts Costing $1,000 or Less—Won by Dr. Brown, 22 H. P. Buick; time 6.07 1-5.

Runabouts Unlimited—Won by D. O. McCann, 30 H. P. Franklin; time 6.32 3-5.

Runabouts Costing $1,500 or Less—Won by Dr. Brown, 22 H. P. Buick; time 6.05.

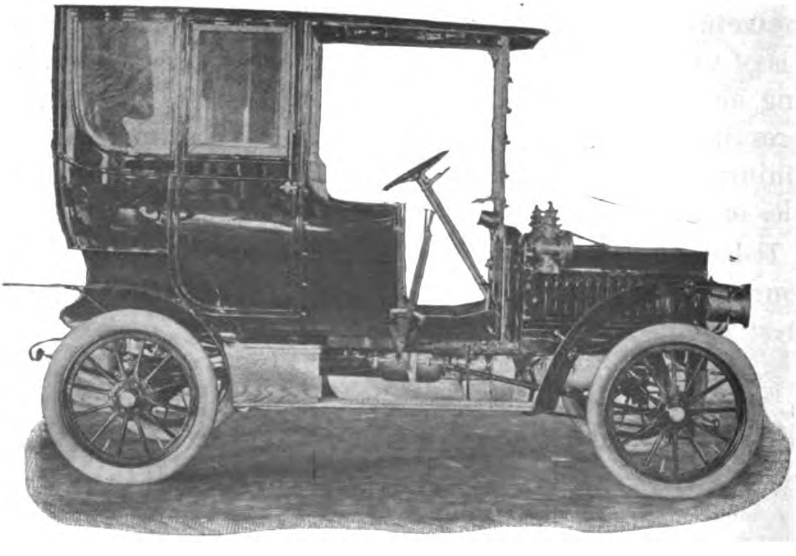
Touring Cars Costing $1,500 or Less—Won by L. T. Shettler, 16 H. P. Reo; time 6.47 2-5.

Touring Cars Costing $2,500 or Under—Won by H. L. Olive, 30 H. P. Stoddard-Dayton; time 6.26 2-5.

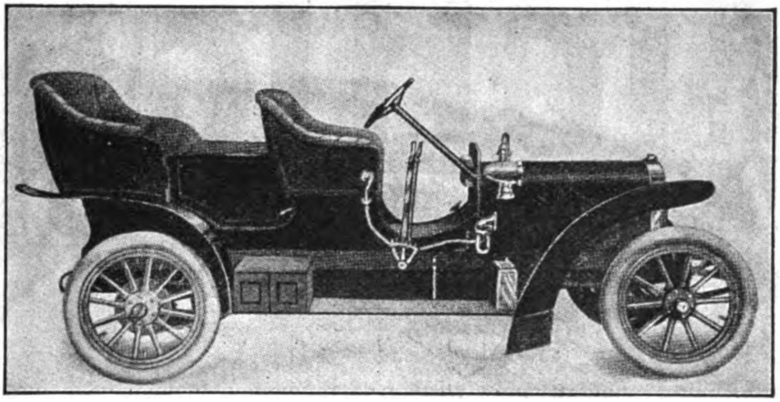
Touring Cars Unlimited—Won by Thomas Hughes, 59 H. P. Thomas; time 4.58 1-5.

Maine's Successful Show

The first annual automobile and power boat show ever held in the state of Maine opened in the Portland Auditorium, Monday morning, February 26, and continued successfully during the week. The building was crowded with exhibitors, and the attention of automobilists from all parts of Maine was centered upon it. Frederick M. Prescott, of Boston, was the promoter. The Auditorium was elaborately decorated with American flags and streamers of many colored bunting. The main floor was occupied by automobiles, motor boats, motors and accessories.



Moline Model C Limousine, Price $2650. Illustrated, through error, last month with the Marmon Model Dinscription.



"Beebe" 30 H. P. Touring Car, 2-cylinder, 5x5, 2-cycle motor, started from seat; friction transmission; roller chain drive; 30x3½ inch tires; standard tread; wheel base 100 inches. Price $1250.

"Beebe" 2-Cycle Cars

Western Motor Truck and Vehicle Works, 27 S. Clinton St., Chicago, Ill., have just placed on the market two 2-cycle cars, one a runabout listing at $650 and the other a touring car at $1250.

The touring car is fitted with a 30 H. P. 2-cylinder, 5x5 gasoline engine of the 2-cycle type, which drives the car at speeds up to 40 miles per hour. The wheel base is 100 in. and the tread standard. Hartford tires, 30 x3½ in. are fitted. The engine is started from the seat by a push button operated by the foot. Three brakes are fitted. The carburetor is of peculiar design. It is tubular, with a single valve. The gasoline flows around a special material which absorbs the liquid and effuses from millions of little pores a light gaseous vapor. The air passing over this gas-laden surface produces a mixture of great volume, strength and combustible power. This carburetor overcomes the usual troubles in carburization, it is claimed.

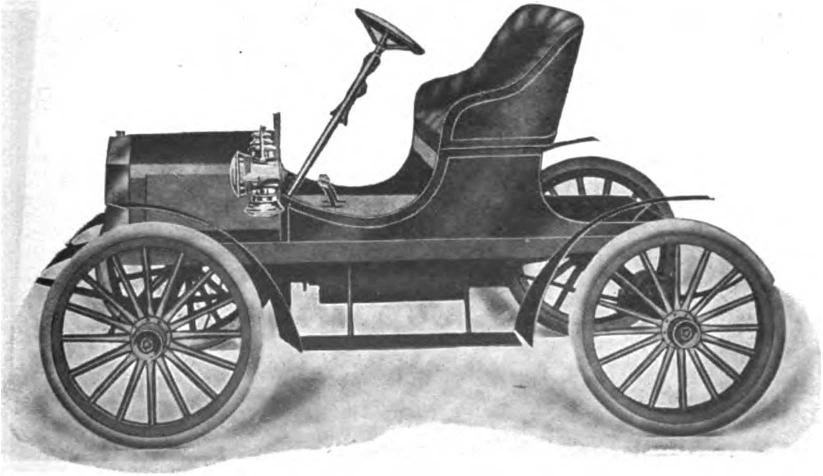
A frictional transmission is used. Foot and hand levers operate the brakes.

The runabout is particularly adapted to country roads having large wheels with 36x1¾-inch solid tires. It has a 14 H. P., 2-cycle engine. The wheel base is 80 ins., tread standard.

Fuller details of these novel cars are not available at this writing. Exterior views of both are here given.

A touring competition is being arranged in France by Marcus De Dion that will require the cars to travel 5000 kilometers from June 20 to July 20. The tour will take the motorists through Italy, Switzerland, Austria, Russia, Germany and France.

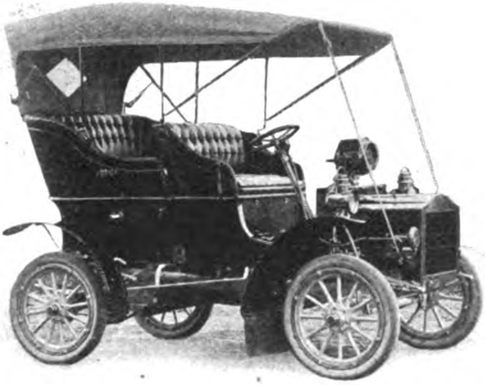
An automobile show will be held in Omaha, Neb., in the large new auditorium, April 4 to 7 inclusive and will be the first exhibition of the kind in this part of the country. The committee having charge of the arrangements and exhibition space is composed of H. E. Frederickson, Clark Powell, J. J. Deright, John Lionberger and J. Clarke Coit. Manager Gillan of the auditorium is co-operating in the plans for the show and will have the general management.



"Beebe" 14 H. P. Runabout; wheel base 80 inches; tread standard; 36x1¾ inch solid tires; mechanism similar in general to touring car power outfit. Price $650.

THE MICHIGAN

Carries Five Persons Easily



Model D. $1,100

ATTENTION!

Are you looking for a **good** car at a moderate price—one worth every dollar asked for it?

Here it is and we can prove it

This car will run as fast as anyone ought to ride, has the power, style, comfort, safety and careful workmanship throughout, necessary to make it a finished product. It is not a thing of a few months or weeks. This is its **third year,** but little changed from its original construction. People who use it **like it.** They are satisfied with its results. What more can one expect?

Order where you can get
PROMPT DELIVERIES

Our Catalog tells about it.

MICHIGAN AUTOMOBILE CO., Ltd.
KALAMAZOO, MICH.

THE MICHIGAN

WHAT COUNTS?

Use—not **Boasting.** Anyone can write circus poster advertisements. Those should not count with **you.** Get your **proof** from the **man who has run one.** Here's a little:

Mr. L. W. Frisbee, Supt., Prudential Insurance Co.,
Newark, N. J., writes:

"I have had considerable experience with cars in the past five or six years and have had more comfort and pleasure in the "Michigan" than any one of the others. Anyone purchasing your car will never regret it."

Charleston, W. Va., October 8, 1905

"Enclosed find One Dollar, which you will please send me D 150 (Muffler head front). I am still very much pleased with my machine. This is the first Dollar I have ever spent for repairs, and that is saying a good deal, after running it over West Virginia roads for eight months."

Dr. J. Fleetwood Butts.

Mr. R. A. McCracken, of Waterloo, Wis., writes:

February 19, 1906

"I purchased my first car in 1901, and last year traded for one of your Model D cars, (1904 Model), and am one of your **satisfied users.** Do not think there is a better car to-day, in that class of cars."

Dr. F. J. Dudley, of Cerro Gordo, Ill., writes:

"I find the car to be very satisfactory and have used it extensively in my practice, covering from fifty to seventy-five miles, daily. The car is powerful, speedy, comfortable to ride in and gives but very little trouble. I am very well satisfied."

Space in this magazine costs money. If it didn't, we'd put in a lot more. Do these statements prove anything? Buy from experienced makers—a car that has "stood the racket."

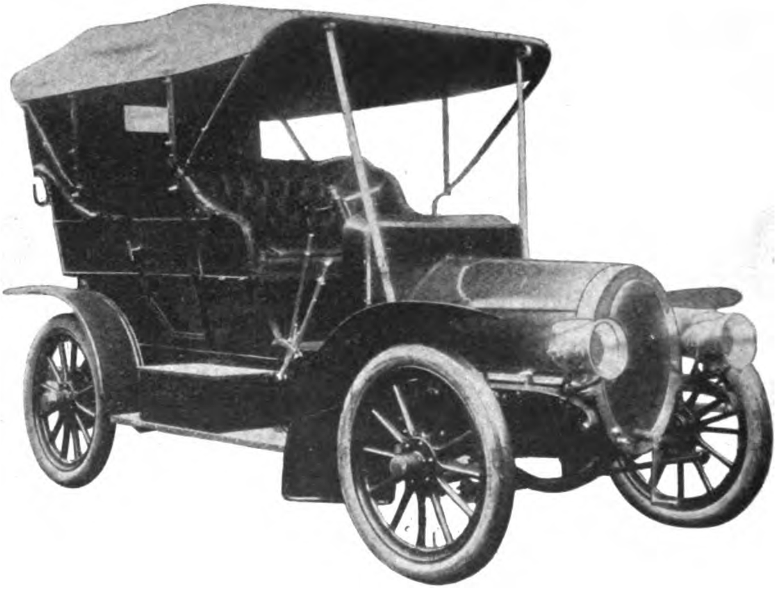
Michigan Automobile Co., Ltd.
KALAMAZOO, MICH.

The Ariel, 1906, 30 H. P. Four Cylinder Touring Car

E. P. CLARK.

The Ariel car, built by the Ariel Motor Car Co. of Boston, Mass., was exhibited at the Armory show in New York in January, and attracted much attention by its pleasing and distinctive appearance, the oval radiator and distinctively shaped cast aluminum dash serving to give the car an individuality of its own. In construction details the car also possesses many points of individuality and novelty, yet all tending to simplicity of design and reliability of operation.

The engine is of the four-cylinder, four-cycle, water-cooled type, having cylinders 4⅜ in. in diameter and four inch stroke of pistons, and is rated at thirty horse power.



The Ariel 30 H. P. 4-cylinder touring car. Wheel base, 100 in.; tread, 56 in.; tires, 32x3½ in.; frame of pressed steel 128 in. long by 32½ in. wide; engine, 4-cylinder, 4-cycle, water-cooled; cylinders 4⅜ diameter, 4 in. stroke, sliding gear transmission, 3 speeds forward and reverse; jump spark ignition; bevel gear drive; cast aluminum dash; speed, 45 miles per hour; weight, 1975 lbs.; price, $2500.

The cylinders are cast singly of gray iron with heads and water jackets integral. The valves, all positively actuated, are located in the cylinder heads and are of steel and interchangeable.

The cam shaft actuating the valves is supported in bearings directly above the cylinder heads, and operates the valves by means of short levers. Although the Ariel Company is not the only one making use of this position for the cam shaft, yet it is claimed that they were among the first to adopt it, if not actually the first ones to so place it. The cams are formed in pairs of tool steel, one inlet and one exhaust cam being formed in a single piece. The cams are hardened and tempered and are securely pinned to the steel cam shaft. This cam shaft is driven by means of a short vertical shaft at the rear end of the engine, through a pair of mitre and a pair of bevel gear, the mitre pair being at the lower end of the vertical shaft and driving it from the crank shaft, at the same speed as that of the crank, the bevel pair, with a ratio of 2 to 1, being at the upper end of the vertical and driving the cam shaft at its proper speed. All these gears are of steel, with teeth accurately planed, are case-hardened, and run in dust proof cases, the whole forming a very simple and mechanical form of driving, which offers the advantage that the entire cam shaft with its cams and levers is instantly accessible for inspection at any time, and, in fact, so easily accessible is this action that the entire set of valves, with their actuating mechanism, can be removed in less than ten minutes.

The pistons, of gray iron, are supplied with three rings. The wrist pins are of tool steel, are hollow and are hardened and ground to fit.

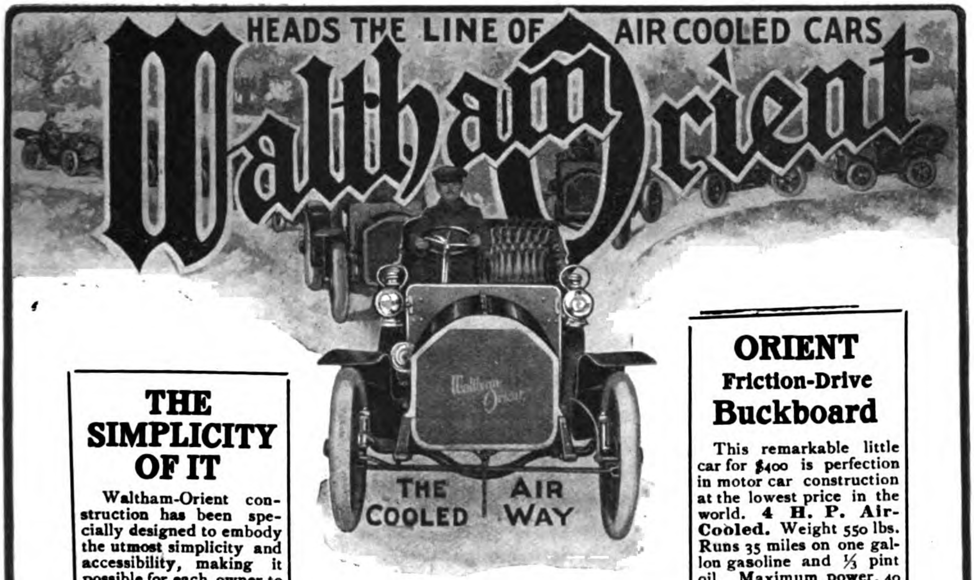
The connecting rods are drop-forged of steel and provided with bronze bushings at both ends.

The cap of crank pin end is secured by two bolts, with castellated nuts and cotter pins.

The crank shaft is drop-forged of tough steel, is of ample strength and runs in five bronze bearings.

The crank case is of aluminum and is provided with four hand holes in its bottom through which adjustments to the crank pin bearings can be made without removing the lower half of the crank case.

The fly wheel is of gray iron, secured to the crank shaft by means of a taper fit key and nut and carries the clutch, which is of the leather faced aluminum cone type.



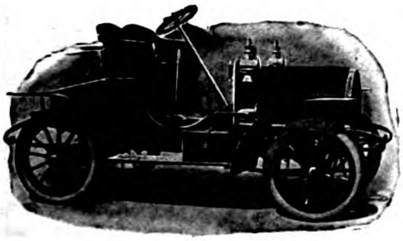
THE SIMPLICITY OF IT

Waltham-Orient construction has been specially designed to embody the utmost simplicity and accessibility, making it possible for each owner to adjust and tune his car without expert assistance. The four-cylinder motor of the Waltham-Orient is so constructed that it gives the greatest possible area of cooling surface at the point where it is most needed, and to avoid all useless weight of metal where radiation is not necessary. This important factor, coupled with the perfect system of radiation, assisted by a powerful fan, insures a uniformly cool engine entirely free from overheating or pre-ignition, regardless of climatic changes or conditions. Air-Cooling eliminates the necessity of water jackets and plumbing, thus reducing weight in construction, wear on motor and bearings, makes the car a stranger to the repair shop, enables it to run every day in the year and increases its elasticity and responsiveness. The absence of confusing complications of control enables a woman to drive it with ease.

ORIENT
Friction-Drive
Buckboard

This remarkable little car for $400 is perfection in motor car construction at the lowest price in the world. **4 H. P. Air-Cooled.** Weight 550 lbs. Runs 35 miles on one gallon gasoline and ⅓ pint oil. Maximum power, 40 to 1. Innumerable speeds forward and **reverse.** Speed 25 miles an hour. The Buckboard has been appropriately termed the "sand crab" because of its power to get over the sandiest roads with but little extra effort. Its ability to negotiate steep grades admits of no comparison.

MODEL BB. $400



MODEL K, $1600

Five Touring Models for 1906

Model N, 20 H. P., $2000
Model K, 20 H. P., $2250.
Model M, 16 H. P., $1750.
Model L, 16 H. P., $1750.
Model K, 16 H. P., $1600.

Active agents wanted for unassigned territory.

Write for new 1906 Catalog and Agency proposition

WALTHAM MANUFACTURING CO.

General Office and Factory: WALTHAM, MASS., U. S. A.

DISTRIBUTING DEPOTS.

New York—Waltham Mfg. Co., 1615 Broadway.
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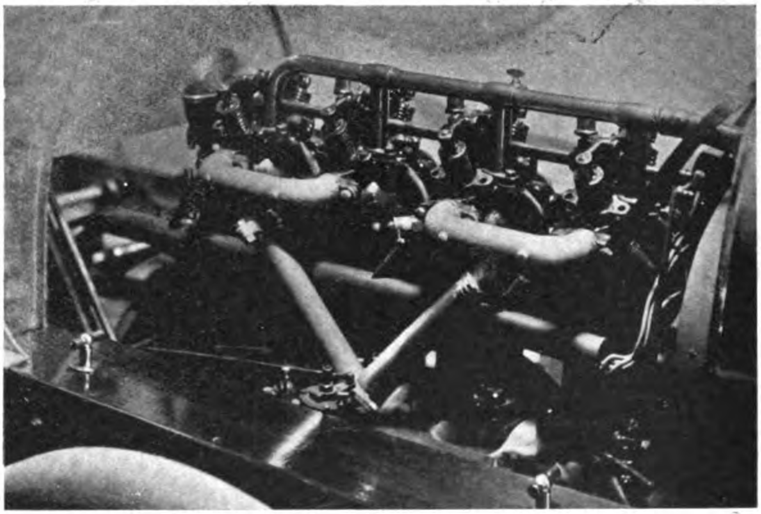
Boston—Waltham-Orient Motor Car Co., 220 Eliot St.
Philadelphia—Martin & Hart Motor Co., 215 N. Broad St.
Baltimore—Auto Supply & Storage Co., 1416 Madison Ave.
Providence—The Shepard Company, Crown Garage.
Los Angeles—Diamond Motor Car Co., 959 Main St.
Winnipeg—Threshers' Supply Co., 120 Lombard St.

Members Association of Licensed Automobile Manufacturers.

The ignition is by high tension jump-spark from a quad coil, supplied by storage battery. The timer is very accessibly located on the front end of the cam shaft. The spark advance is by means of a lever on steering post.

The cooling system is by water, circulated by means of a gear pump located on the vertical shaft at the rear of the engine, through which the cam shaft is driven; consequently the pump runs at full engine speed instead of at half speed, which is the rule in most machines of the present time.



Inlet side of Ariel 30 H. P. 4-cylinder engine, showing cam shaft mounted above cylinder heads, also cams and valv action.

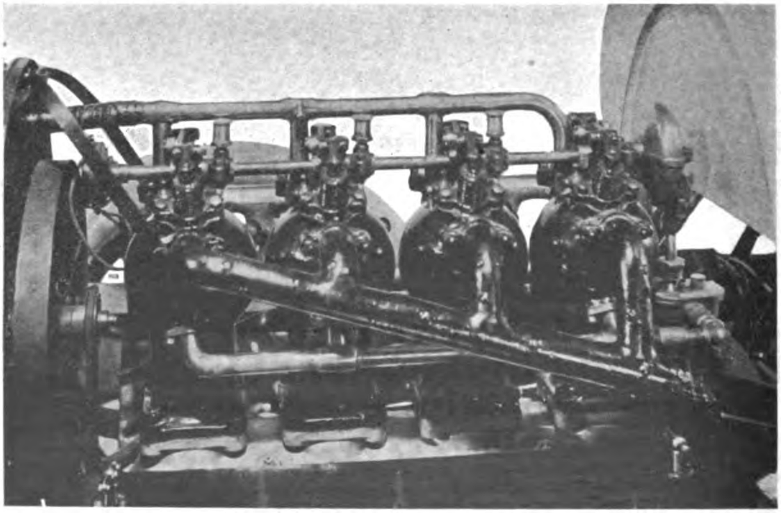
The tubular radiator, which is of the Whitlock make, is of a distinctive and pleasing oval shape, and is one of the first features of the car to impress itself upon the mind. A fan located behind the radiator and driven by belt from the crank shaft assists in the cooling.

The lubrication is by splash from the crank case, a mechanical force feed oiler being employed, delivering through two feeds, one into each half of the crank case.

This simple lubricating system has proved itself perfectly efficient and satisfactory in these cars.

The Holley carburetor is employed, the feed of gasoline being by gravity from the tank, which is located under the front seat.

The tank is of copper and is of twenty gallons capacity.



Exhaust side of Ariel 30 H. P. 4-cylinder engine.

The transmission is of the sliding gear type, three speeds forward and one reverse being provided, the drive being direct on the high speed, the gear changing lever operating on a notched quadrant plate.

The gears are of .22 carbon steel, carefully case-hardened and are of ample size and strength.

CORBIN CARS

CORBIN CARS are air-cooled cars, and the **CORBIN** system of air-cooling is a complete vindication of the practicability of air-cooling. The advantages of this system are as obvious as the disadvantages of the water-cooled system are apparent.

About six months of the year water-cooled automobiles must either contain an anti-freezing compound, or run the risk of being injured through freezing. Air-cooled automobiles entirely overcome this objection, in addition to which it greatly simplifies the construction, as it makes unnecessary tanks, radiators, water pumps, and considerable piping. Many manufacturers cannot make satisfactory air-cooled cars, but there are others that can. That is why **CORBIN CARS** have become universally popular.

The **CORBIN** Line for 1906 consists of two models only, a five-passenger, light touring car, Model "E", 24 H. P., 100" wheel base, weighing 1,800 pounds, at $2,000; and a two-passenger car, Model "G", 24 H. P., 93" wheel base, weighing 1600 pounds, at $1,800.

Corbin Motor Vehicle Corporation

Makers of Corbin Air Cooled Motor Cars :: New Britain, Conn.

1404 Michigan Ave., Chicago
5905 Centre Ave., Pittsburgh
470 Bread St., Newark, N. J.
Court and Exchange Sts., Rochester, N. Y.
E. Market and William St., Elmira, N. Y.
4 West 38th St., New York
Motor Mart, Park Square, Boston
206 N. Broad St., Philadelphia
12th and State Sts., Erie, Pa.
115 E. 7th St., Cincinnati
670 Main St., Buffalo, N. Y.

The transmission gear case is of aluminum and is provided with a large inspection, opening at the top closed with an aluminum plate.

The shafts of the transmission are of case-hardened steel and run in bronze bearings.

From the transmission to the rear axle, the drive is by propeller shaft, and bevel gear drive, the rear axle being a special design by the builders, the details of which are not available.

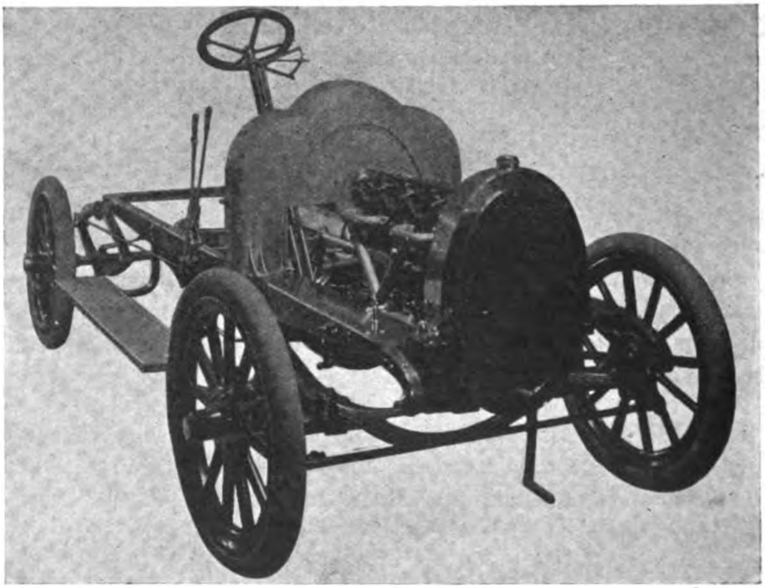
The front axle is a casting of Parsons manganese bronze, a material which is finding quite a prominent place in the list of materials used in many of the modern cars, its advantages being that its strength and rigidity are about the same as those of machinery steel, while it may readily be cast in forms which could not be drop forged, as well as its freedom from all liability to fatigue or crystallize, which are features of great value for many places.

The control of the car is by two pedals, one of which actuates the clutch, while the other controls the service brake on the transmission shaft. Two levers at the driver's right hand, one controlling the gear changing and the other the emergency brake. The emergency brake is of the internal expanding type, operating in drums secured to the holes of the rear wheels.

The clutch actuating pedal and the gear changing lever are interlocking, rendering it impossible to change gears without first throwing out the clutch, while the clutch cannot be thrown in again unless the gears are properly and securely in mesh.

The steering post carries two small levers, one being the spark advance lever, and the other the throttle, the whole forming a simple and effective control assemblage.

The body is a handsome straight line pattern of the side-entrance tonneau form. The side doors are wide and swing toward the front of the car. The body is strongly constructed of wood, the seat bendings being of the same material.



Three-quarter side view of Ariel 1906 30 H. P. chassis.

The upholstery is of hand buffed leather and all finishing is very rich and in good taste, making the Ariel a very handsome car, which, with its powerful and very silent running engine, cannot fail to give satisfaction to the user.

The frame of the Ariel car is of pressed steel, the frame being 128 inches in length, 32½ in width and the side frames 4 inches in depth at the widest part. The cross members of the frame are also of pressed steel, and the end members formed with strong gussets.

The wheels are of the Wood artillery type, 32 in. diameter, ball bearing, with balls of ⅝ inch diameter and carry tires of 3½ inch diameter, any desired American make being supplied at purchasers' option. The wheel base is 100 inches and the tread 56 inches.

The springs are all of 38 inches length, the front springs being semi-elliptic and the rear springs full elliptic.

The dash, which is of cast aluminum, is of a peculiar shape, as will be seen from our cuts and carries the coil and the mechanical force feed oiler.

The steering device is of the Brown-Lipe pattern.

The total weight of the car is 1975 pounds; its speed 45 miles per hour, with ability to climb grades of ten to twelve per cent. on the high gear.

The price is $2,500 with full outfit, consisting of two gas and two oil side lamps and one tail lamp.

A tool box on the running board is supplied with a particularly full and complete kit of tools, a more liberal supply of extra parts than is usual are also furnished, making in all a list of accessories not often equaled.

IMPROVED

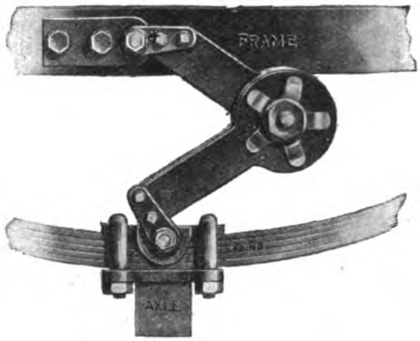
TRUFFAULT-HARTFORD SHOCK ABSORBER

TRADE MARK

Increases the speed. Enables cars to proceed at highest speed over all obstructions.

Doubles the life of tires.

Prevents lost traction.



Absolutely prevents breaking of springs. Makes cobble-stones and rough roads seem like asphalt.

New Model absolutely self-adjusting.

Requires no attention after application.

WARNING

We are the owners of Fundamental Patents entirely covering every practicable form of frictional retarding devices for vehicle springs and hereby warn the trade from handling any infringing device that may be offered for sale. We also warn the trade against the use of the term "SHOCK ABSORBER" which is our trademark.

Don't be misled by devices made on principles which we have discarded.

Adopted by the Pierce Great Arrow, Locomobile, Matheson, Richard-Brasier, Peugeot, Napier, Gobron-Brillié, Studebaker.

Cars under 1500 lbs. $40	Cars over 1500 lbs. $60
(Four Suspensions)	(Four Suspensions)

HARTFORD SUSPENSION CO.

E. V. HARTFORD, Pres. **67 Vestry Street, New York**

We are Sole American Agents for the celebrated

GOBRON-BRILLIÉ

"The Finest Automobile in the World."

The Woods Motor Vehicle Company's 1906 Cars

HUGH DOLNAR.

The Woods Motor Vehicle Company, 110 East Twentieth street, Chicago, Ill., U. S. A., were among the earlier builders of electrically driven cars, and brought out a large 4-cylinder gasoline touring car late in 1904; 108 in. wheel base, to carry seven passengers, and a considerable number of them were built and sold in 1905, giving entire satisfaction to purchasers.

The Woods Company has been producing electric motor-driven cars since 1896, constantly improving its designs, and during 1904 made important changes which produce an entirely self contained electric motive assemblage mounted on a Parson's bronze frame, carrying the motor and counter shaft, the counter shaft being supported in swinging hangers to permit chain adjustment without change of rear axle position.

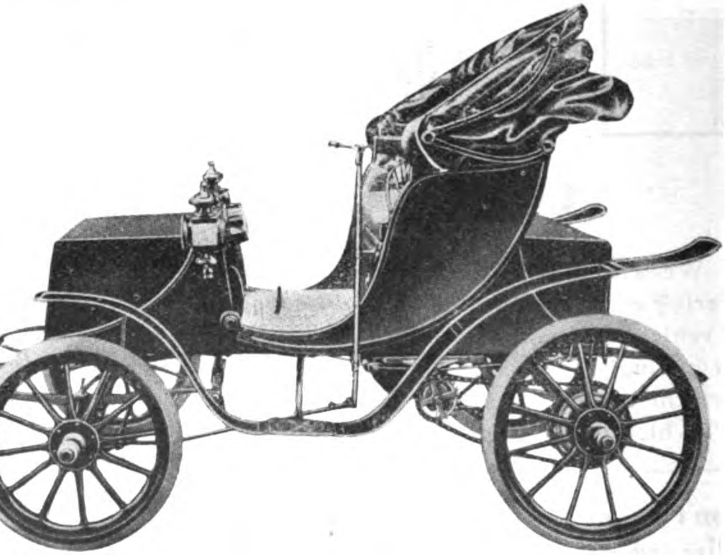


Fig. 1. The Woods "Queen Victoria" Electric Car, see Fig. 2, same with detachable brougham top applied. Wheel base 73 in., solid tires, 36 in. dia. rear, 32 in. dia. front, all 2½ in. wide, "Firestone," side wired, gauge 56 in. outside to outside. Motor, Woods Company's own construction throughout, all on Hess-Bright ball bearings, 40 cells, 9 M. V. battery. Hess-Bright bearings throughout, including wheel hubs; folding top; weight 2600 pounds; price $1900; detachable brougham top $600 extra. See Fig. 2. Price includes mat, tools, electric bell, electric lamps, and electric lights in the brougham top.

The first Woods Company's electrics used two motors with spur pinion and gear to the rear wheels, and this form of driving gear was continued through 1905, but is now abandoned in favor of the self contained driving assemblage produced in 1905, in which a single motor drives a counter shaft by means of a herring-bone pinion and gear all on an integral bronze frame support for the entire driving assemblage, as before mentioned.

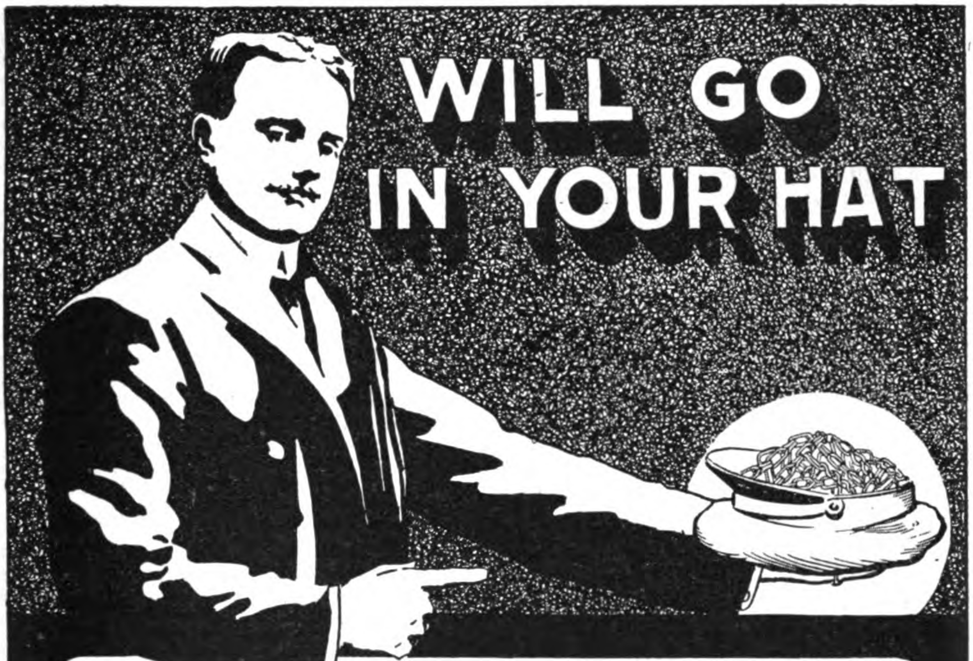
For the 1906 four-cylinder car the wheel base is increased to 120 in., the motor cylinders remaining the same, 5x5 stroke and bore, but being changed in details; the threaded valve caps are now made with external hexagons instead of internal, so as to be turned by an ordinary wrench in place of the special wrench before required, the pistons are lengthened from 5 to 6½ in., the crank shaft boxes have been changed to all five independent caps, instead of the former three caps independent and separate, and two caps integral with the crank box oil basin, and the Lacoste commutator has been adopted.

WOODS ELECTRIC CARS.

In 1902 the Woods Company devised improved forms of French platform springs, and applied these in both front and rear to electric cars, making the axle springs ¾ elliptics, and changing the form of top member of the ¾ elliptic to give a better support and fixing. These improved Woods springs have since been copied by other makers of electric cars and claimed as highly valuable original features.

The 1904 self contained electric driving assemblage has been improved for 1906 by substituting Hess-Bright ball bearings for those formerly fitted, so that the 1906 Woods electrics have all four wheels and the counter shaft on Hess-Bright bearings.

One of the principal advantages sought in the Woods 1902 spring form changes was bringing the body spring supports directly over the points of spring support on the axles, so as to obtain the best possible spring action. This important advantage would be lost if the rear axle was moved to tighten the side chains, and again, no two side chains are ever exactly the same length, hence each end of the counter shaft should have an independent chain tightening adjustment so that chain slack can be equally taken up on both sides without moving the axle out of square with the body.



Weed Chain Tire Grips

Take very little car space and are **Necessary as Gasoline.**

This is the only practical Traction Device, and gives that necessary grip in MUD, SAND, SNOW or ICE.

Cannot injure the tires as they creep a revolution in three to five miles.

Weed Chain Tire Grip Co.

28 Moore St., New York

To meet these conditions and requirement the Woods 1906 counter shaft and motor support has been devised as shown in Fig. 3, which gives ideal support to the drive and ideal adjustment possibilities, and also perfectly protects all moving parts and joints from dust, details as follows:

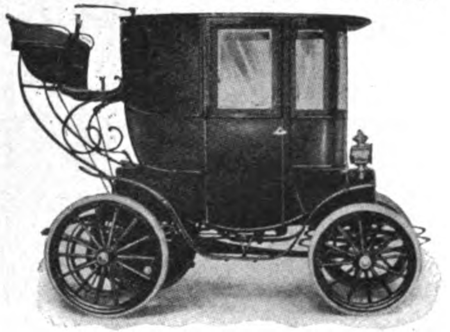


Fig. 2. Woods Queen Victoria Electric Car, detachable brougham top applied. The folding top of the Queen Victoria, Fig. 1, is mounted on a detachable "shifting rail," or base, forged, held with bolts, so as to be easily removed, to permit the placing of the detachable brougham top, converting the car shown in Fig. 1 to that shown in Fig. 2. These cars are commonly used open, Fig. 1, in summer, and closed, Fig. 2, in the cold months.

The motive frame is a long open bronze casting, having integral cross girts to support the motor, with integral down hanging lugs at each end to make hinge members to support the swinging bearings for the two ball-bearing carried short sprocket shafts, independently adjusted by universally jointed struts from the rear axle to the sprocket shafts carrying sleeves, strut adjustment check-nut retained.

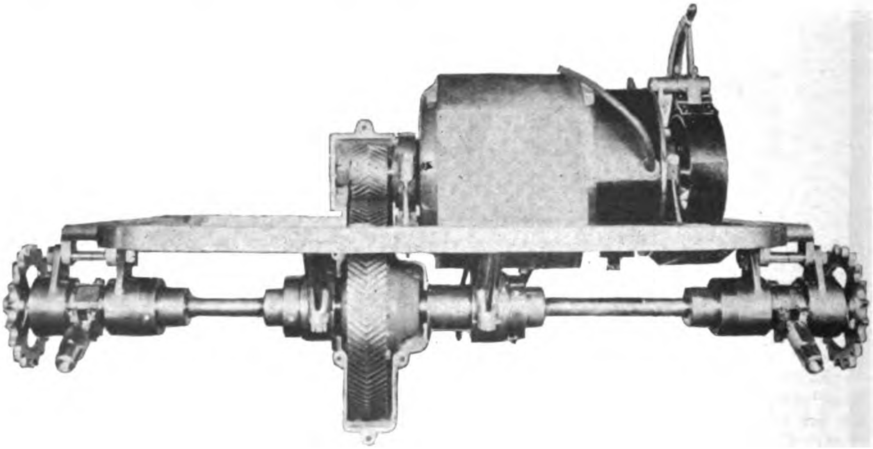


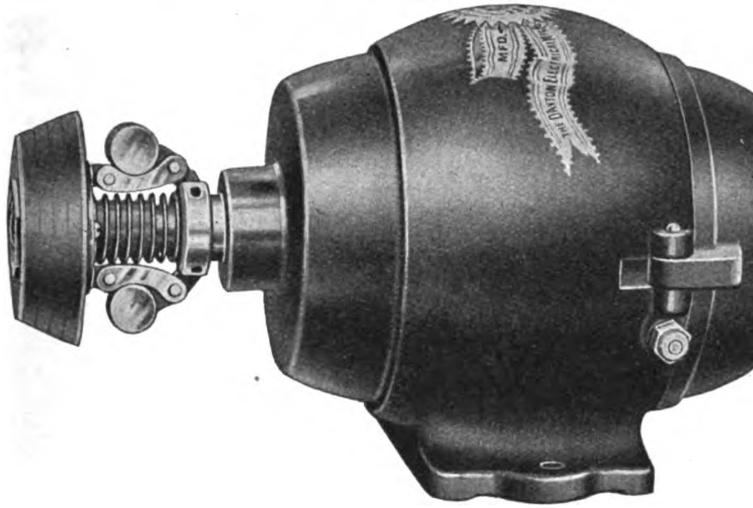
Fig. 3. Woods Electric "Victoria" Motor and counter shaft assemblage; one Parsons bronze casting supports the motor, with substantial integral hangers to take the middle part of the counter shaft, "herring-bone" pinion on motor shaft and gear on counter shaft. The sprocket shafts are independent swinging sleeves, with universally jointed driving shafts for each, to give independent sprocket adjustments. Everything on Hess-Bright ball bearings. All of Woods Company's own design and own construction. Every working piece of the propulsion system is supported by this single bronze frame, making misalignment impossible, bar fracture.

Two strong down hangers having bored seats below take ball bearing supporting sleeves in which the two members of the divided countershaft are supported; these short middle countershaft members end in universal joint members, which drive two propeller shafts, universally jointed to the two sprocket shafts in swinging bearings, before mentioned. Illustrations are given of the hubs and brake drum in section, and the motive assemblage, which will enable the reader to understand these very complete and functionally ideal sprocket shaft supporting, driving, and adjusting elements, in which everything is cased in, and all revolving parts are carried on Hess-Bright ball bearings.

The motor as well as all other parts of these "Queen Victorias" are not only of Woods Company's designs, but are made in the Woods Company's own shops, of carefully selected materials, handled by the best workmen.

The side chain drive and solid stationary rear axle are unquestionably the most substantial known to the motor car constructor, and side chains drive with less friction than the bevel gear on the rear axle. It is better to place the balance and bevel gear on the countershaft, which runs fast, and therefore does not require great strength, than to place these members with the slow running rear axle, where they must be made much larger and stronger, and where they are subjected to much heavier work than if placed on a quick running countershaft with chains and sprockets to the rear axle. The counter shaft runs about three times as fast as the rear axle, and can therefore transmit the same power safely with very much smaller and lighter parts, which can be elaborately finished at much less cost than if they were as large and heavy as they should be to transmit the same power at the lower speed.

Again, the electric car can be given only a limited amount of current at one charge, and it is highly desirable that their limited supply of electric current, stored in the car batteries, should drive the car as far as possible, hence every expedient of the designer which can increase the mileage of an electric car by decreasing the friction of the drive should be employed. These conditions make the electric car more a difficult construction



Apple Battery Charger

A current of absolute evenness is required to operate a jump spark coil perfectly.

A more even flow of current can be obtained from storage batteries than from any other known source.

And sparks from storage battery current give off heat that will explode an entire charge at an instant. That is what gets all the possible power out of an explosion.

Over 65 per cent. of the 1906 Cars are equipped with storage batteries.

The Apple Battery Charger is for charging storage batteries right on your car.

It is a dynamo turned by the engine fly wheel which delivers a current that keeps the batteries fully charged and in the pink of condition.

Over-charging, complete discharging and rapid charging are all very injurious to storage batteries.

The Apple Battery Charger is equipped with a governor which provides for charging the battery in proportion to the battery's discharge. This eliminates overcharging.

There is no possibility of complete discharging because the dynamo charges the battery all the time that the battery is giving off current and as the battery charger is charging all the time it can charge at a slow rate.

Thus with an Apple Battery Charger on your car your batteries will never be over charged, completely discharged or charged too rapidly, but they will always be in a healthy, ever-ready condition.

The Apple Battery Charger is a dynamo in which the best material obtainable is used and it is designed and built as well as any dynamo in the world irrespective of size or use for which intended.

It is entirely enclosed, dirt, dust, oil and water proof.

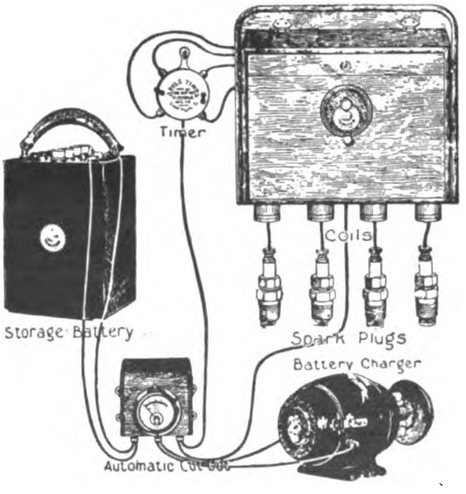
It can be run in any position, and can be installed on any automobile.

The Apple Battery Charger is the new and central feature of the 1906 Apple Ignition System.

The figure below illustrates the new Apple Ignition System. It consists of the Apple Battery Charger, the Apple Storage Battery and the Apple Automatic Cut-Out with the necessary timers, coils and plugs. The cut-out severs the dynamo connection when the engine stops so that the battery current will not run back through the dynamo. The battery is composed of non-breakable, lead-bottle units made especially for portable use.

This is the latest and best ignition system with which you can have your car equipped.

Write for full information about the Apple Battery Charger and the Apple Ignition System to-day.



THE DAYTON ELECTRICAL MFG. CO.

89 St. Clair St., - - - DAYTON, O.

than the motor car driven by a prime mover, which can have the power of its motor increased by comparatively small weight additions, and has unlimited range.

All of these considerations have been forced upon the attention of the Woods Company, which was one of the first American builders of electrically driven vehicles, by long experience with the early forms of these cars, in which low first cost and simple design were placed before perfection of transmission details, and which had not much more than half the range of the present Woods "Queen Victorias" for the same battery weight because the transmission elements were not so well finished, and above all, because they were not so well supported, nor capable of such accurate adjustment.

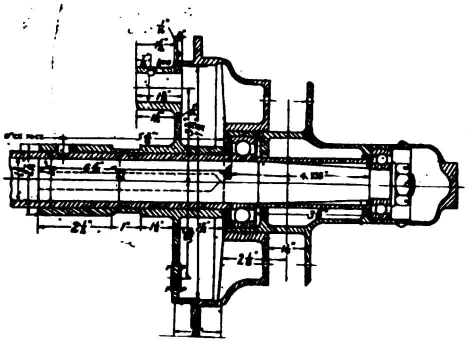


Fig. 4. Woods Electric Queen Victoria platform springs and rear axle. The cross hanger A, A, and brace B, lengthwise, give a fixed support for the middle of the cross spring E, E. The top quarter spring has a front part, D, of considerable length, so as to obtain two points, some distance apart, for attachment of top springs to the body. The front members, C, C, of the lower side springs are nearly rigid, and are so short as to give a good support to the cross spring, E, sidewise. This particular form of platform spring assemblage, of which the brace, B, is an important member, is the result of many experiments; the extended support of the top spring on the body and the brace, B, are of great value.

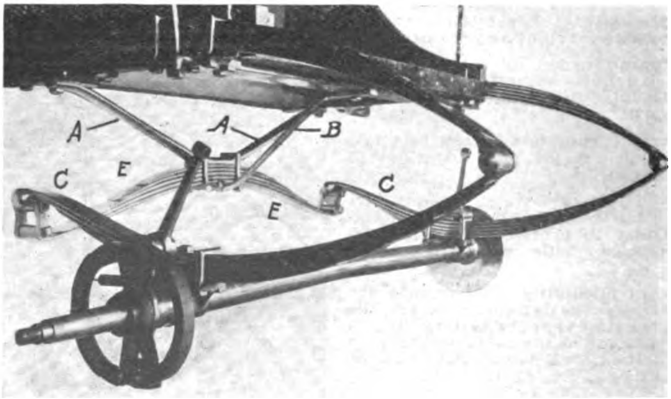


Fig. 3. Woods Electric "Victoria" Rear Hub, with Hess-Bright bearings, brake drum integral.

The motive assemblage of the 1906 Woods Queen Victoria is shown in Fig. 3, and consists first of an integral Parson's B bronze frame large enough to take the motor and counter shaft, and strong enough to support all the running parts in unvarying relative positions. The rear axle is accurately placed well suited to their purpose and were not so and its position is not changed by chain adjustment, as above stated, and the Woods Queen Victoria counter shaft is made with no less than five members, a middle part, rigidly located on the driving frame, so as to be always in a fixed position with relation to the motor, and the two independently adjusted sprocket shafts are driven from the fixed middle member by two universally jointed propeller shafts, so that each side chain can be given exactly the best tension without regard to its length, so as to be perfectly silent and do its work with the least power expenditure. This whole assemblage of moving parts shown in Fig. 3 is on Hess-Bright bearings, and the driving gear is very wide, and is given the "herring-bone" form of teeth, each gear made of two parts cut with quick spirals, right and left hands, so as to run with perfect smoothness and silence, and all the gearing is cased in so that it can be abundantly lubricated and kept perfectly clean.

To adapt the Queen Victoria perfectly to both summer and winter use the open body is fitted with a folding top built on a wrought iron base which can be removed entire from the car, and be replaced by an enclosed brougham top of elegant appearance, as shown in Fig. 2. This brougham top converts the open Queen Victoria into a closed vehicle, ensuring comfort in any weather.

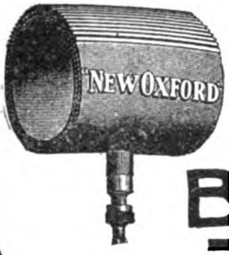
Wire cables are led from the brake rocker arms, guided by grooved grey iron pulleys, to a short evener well forward, and the brake applying pull is linked to the middle of this evener, making an exactly even application of force to the two brake rockers, as one is balanced against the other.

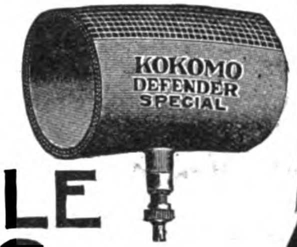
The Woods Company aims at the production of the best motor vehicles possible, without regard to costs of either materials or labor. The machine plant is excellent, and the company makes everything itself, motors, axles, and bodies included, and knows what goes into its cars, both rough and finished.

THE WOODS 1906 FOUR-CYLINDER GASOLINE CAR.

Woods 1906 four-cylinder car has a wheel base of 120 in., gauge 56 in., tires 36x4½ in., Michelin or Continental; motor, four cylin-

THE KOKOMO





BICYCLE TIRES ARE A PAIR OF ACES

Business is Like a Game of Chance

The surest way to win, is to have winners, and the surest way to get winners, in the bicycle tire line, is to buy the

New Oxford and Kokomo Defender Special Tires

The 1906 Kokomo line adds just one more year's reputation to the already good name which our tires have won, as a result of being well and carefully made of first-class material. Don't experiment. Buy a sure winner. For further particulars, write

KOKOMO RUBBER CO.,
KOKOMO, INDIANA.

ders, 4-cycle, water-cooled, 5x5 in., vertical, tandem; weight, chassis alone, 2700 lbs.; seats for nine passengers, three on rear tonneau seat, two on two small side seats adjoining rear seat, two on a front tonneau seat dos-a-dos to 2-passenger front seat, nine seats in all. Bodies to order, tonneau, Pullman, limousine, or otherwise; price, tonneau body, $4750, removable limousine $5250, Pullman $5500. Prices include mats, horn, tools, five lamps, clock, speedometer, everything complete for extended touring.

NOTABLE FEATURES.

The side chain drive is used in all Woods cars, the bodies are of carefully studied design and nothing is spared in the way of materials or workmanship to make them the most elegant and luxurious that can be produced. The motors have ground pistons and cylinders, the sliding gear is on Hess-Bright ball bearings, the steering is by a multiple-thread screw, hardened, working in a hardened nut integral with a hardened rack which engages a hardened sector integral with the steering arm shaft, to which the arm is fixed by a taper seat, key and nut. The pinion and arm shaft, integral, is in an eccentric bushing, revolved for adjustment, notched flange retention, making a delicate adjustment possible. The motor is unusually flexible, strong at from 120 to 1200 R. P. M., 40 B. H. P. maximum. Hill precision oiling, and the leather-faced cone clutch, fitted with eight flat gradual engagement springs, has a novel clutch spring tension regulating device, which can be adjusted to produce the best possible effect. See illustration, Woods clutch.

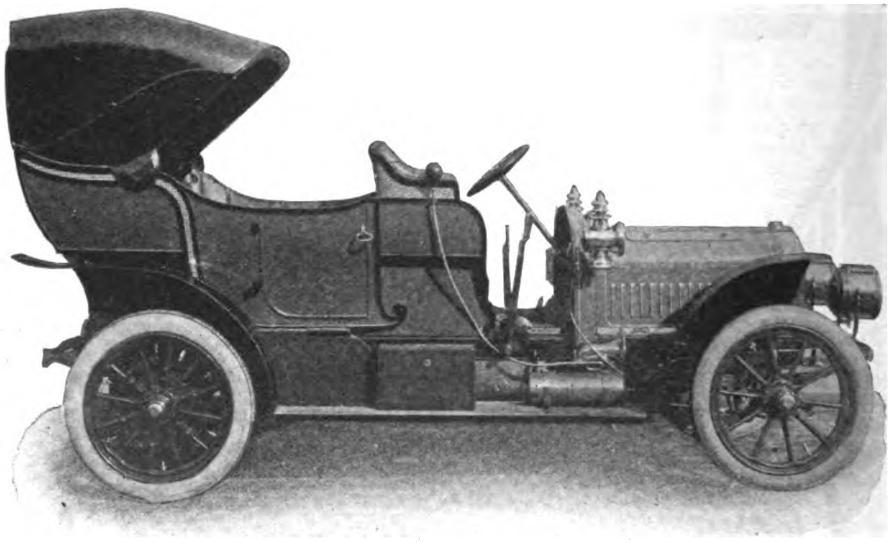


Fig. 6. Woods 1906 4-Cylinder Gasoline Car has a wheel base of [illegible] in., gauge 56 in., tires 36x4½ in., Michelin or Continental. Motor, 4 cylinders, 4-cycle, water-cooled, 5x5 in., vertical, tandem; weight, chassis alone, 2700 lbs.; seats for 9 passengers, 3 on rear tonneau seat, 2 on 2 small side seats adjoining rear seat, 2 on a front tonneau seat, dos-a-dos to 2-passenger front seat, nine seats in all; bodies to order, tonneau, Pullman, limousine or otherwise. Price, tonneau body, $4750, removable limousine, $5250, Pullman, $5500. Prices include mats, horn, tools, five lamps, clock, speedometer, everything complete for extended touring.

THE BRAKES AND CONTROL.

Two rear hub internal brakes are fitted, drums 12x3½ in., internal face, hinged, fibre-faced, cam-rocker expanded internal brake-shoes, dust proof encased, the struts and brake drums are an integral Parsons bronze casting, screw and lock nut adjustment, sleeve adjustment nut, journaled to rock in the strut bearing. This whole brake drum and strut, integral bronze casting, is very carefully worked out, and makes one of the best rear hub brake assemblages known to the writer, Woods Company's own design, see illustration.

The counter shaft brake drum, exterior, fibre-lined band, is 10x3 in., pedal applied, is interlocked, and the pedal is also linked to the throttle, so that the sequence of operations is to disengage the clutch, next to throttle the motor, and finally to apply the counter-shaft brake.

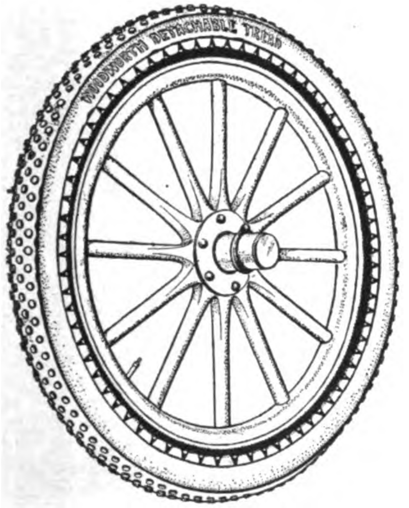
The spark and throttle are controlled by ratchet retained levers on top of the steering wheel. An independent accelerating pedal gives an increased throttle opening, automatic control resumed as soon as pedal is released.

The outer vertical lever first disengages the clutch and then applies the rear hub emergency brakes. The inside lever works the gear shift, and is not interlocked with anything else. The gear-shift routine for speed increase is to first bring the car speed up by the throttle pedal, then disengage the clutch by the clutch pedal, interlocked with the throttle only, and then make the gear shift. This manually directed sequence is preferred by the Woods designers to mechanical interlocking.

The front and rear axles are hand forged from steel. All wheels are on Hess-Bright ball bearings. The rear axle has 4 in. drop, and the front axle drop curve is below the flywheel. The road clearance is 9¼ in.

The springs are half elliptics, 48 in. long in the rear, and 44 in. front, all 2 in. wide, 8 leaves in rear and 7 leaves in front.

WOODWORTH Detachable Treads



Cure Tire Troubles

Enable you to retread old tires without removing them from the rim. When put on new tires, they will prevent skidding and punctures, and keep the tires in perfect condition.

Send for descriptive circular and testimonial sheet.

PRICE LIST

26 x 2	$ 8.00	each
26 x 2½	10.00	"
26 x 3	11.00	"
28 x 2½	11.00	"
28 x 3	12.00	"
28 x 3½	14.00	"
30 x 2½	12.00	"
30 x 3	13.00	"
30 x 3½	15.00	"
30 x 4	16.00	"
32 x 2½	14.00	"
32 x 3	15.00	"
32 x 3½	16.00	"
32 x 4	18.00	"
34 x 2½	15.00	"
34 x 3	16.00	"
34 x 3½	18.00	"
34 x 4	19.00	"
34 x 4½	20.00	"
34 x 5	23.00	"
36 x 2½	16.00	"
36 x 3	18.00	"
36 x 3½	19.00	"
36 x 4	20.00	"
36 x 4½	22.00	"
36 x 5	25.00	"

760 m m x 90 m m tires take 30 x 3½ treads.

Leather Tire Goods Co., Sole Mfrs. Newton Upper Falls, Mass.

The struts are Parsons bronze castings.

Struts and rear hub brake drums integral, revolubly mounted on the rear axle, screw, and check nut adjustment, adjusting screw nut revolubly carried in the front strut end.

The chassis frame is a pressed steel construction, 7-gauge thickness of side members, which are 4 1-10 in. greatest depth. The motor and speed change are on a sub-frame, dropped 4 in., 20 in. wide.

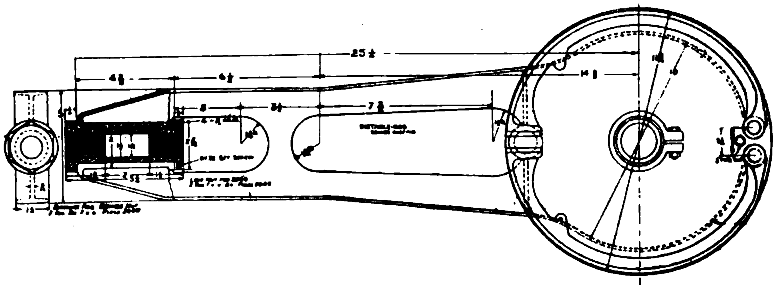


Fig. 7. Woods Strut, or "Distance Rod," and brake-shoe hanger, combined. This is a Parsons bronze casting, 2¼ in. centre to end. The adjustment screw nut is revoluble in its finished seat in the body of the strut. This strut is a notable example of high class motor car detail designing, in which no cost is spared in producing parts of abundant strength and perfect functional adaptation.

THE MOTOR.

This offers no unusual features of design, but is built throughout with the utmost care, to obtain uniformity and reliability of action, the oiling is "Hill precision" fed splash. All the bearings are babbitt-lined bronze, rods steel drop forgings, H-section, bronze bushed on piston pins, bushes split, pinching adjusting screw. The wrist ends of the rods are full marine type, caps held with bolts, tapped into rod-ends, with castellated nuts and split pins. The cylinders are 5x5 in., and the nickel steel crank shafts are all 1½ in. dia., end bearings 4½ in. long, five bearings, the three intermediate 2⅝ in. long. The clutch is coned, leather face, aluminum male member, female member in fly wheel, see illustration, and the original "Woods" clutch spring adjustment, by which uniformity of clutch adjustment may be preserved as the leather facing wears. The clutch angle is 8 deg. on a side, 16 deg. included angle, giving a very reliable engagement. The whole clutch construction is of the highest order for this simplest and most thoroughly proved by practice style of clutch.

SPEED CHANGE.

A short shaft with two universal joints leads from the clutch to the speed change line shaft.

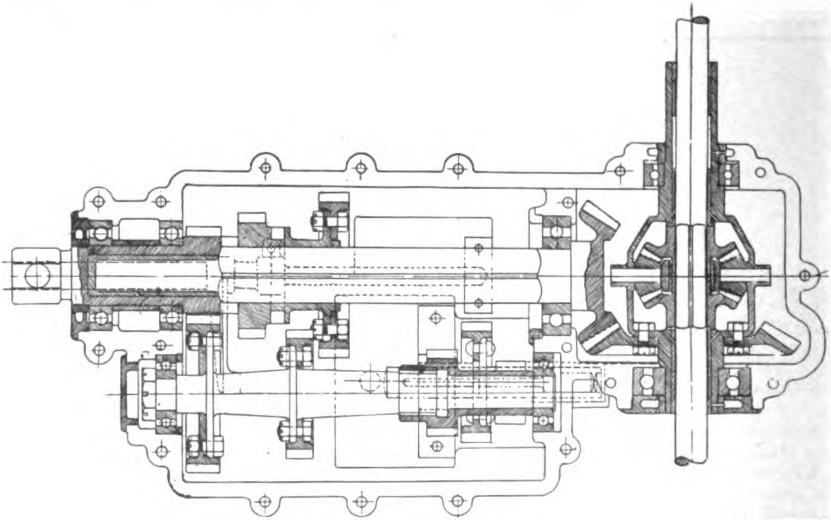


Fig. 8. Woods 4-Cylinder Car, transmission assembly. Everything on Hess-Bright ball bearings. Bevel balance gear. High class construction throughout, everything as good as can possibly be made.

The side shaft is in the horizontal plane of the line shaft and counter shaft, all on Hess-Bright bearings, retained between the upper and lower aluminum casting gear box members. The lower box member has an integral bottom, and is oil tight. The covering member of the box is full size, and can be removed to disassemble the gear. Two hand holes in the cover give access to the bevel balance gear 4 pinions, and to the middle part, by the removal of aluminum hand plates. The squared line shaft is hardened and ground, and the bevel gear and pinion are hard.

The balance bevel gears have square eyes in the hubs, to take the squared ends of the divided counter shaft. The counter shaft is fixed fore and aft, and chain adjustment moves the rear axle, springs shackled at both

READING STANDARD

READING STANDARD

READING STANDARD

AN AVALANCHE OF FACTS

ATTEST THE VALUE OF

Reading Standard Bicycles

They are noted for their graceful design, scientific construction, maximum strength, combined with minimum weight, rigidity of frame, ease of propulsion, and many other features which go to make up a thoroughly good bicycle.

It is significant that they have been winners in every race in which they have been entered. None but a strong, swift and absolutely reliable wheel could establish such a record, or stand up under such severe tests.

We have an attractive line for 1906, consisting of the following models:

Reading Standard "Pace-Follower"	(Men's Model only)	List, $60.00
Reading Standard "Racer"	(Men's Model only)	List, $50.00
Reading Standard "Road Racer" .	(Men's Model only)	List, $40.00
Royal Reading Roadster	(Men's Model)	List, $30.00
Royal Reading Roadster	(Women's Model)	List, $30.00
Reading Special Roadster	(Men's Model only)	List $25.00

Secure the **READING STANDARD AGENCY** if you want to handle ready-sellers this season. You can't handle a better wheel, for there is no better on the market. Write for terms.

Reading Standard Cycle Mfg. Co.

READING, PA.

Leavitt & Bill, San Francisco, Cal., Distributors for State of California.
Scott Supply & Tool Co., Denver, Colo., Distributors for the Rocky Mt. States.

READING STANDARD

ends. The chains are 1¼ in. pitch, ⅝ rollers, sprockets cut with clearance.

BRAKE EQUALIZING.

One loop of wire cable is led around two pulleys from brake rocker to brake rocker, the front cross stretch of this cable touching the rear side of a shive; on the axis of this shive an arm carrying a second shive is pivoted, and the brake rocker pull is transmitted by cable to this swinging second shive arm, this swinging shive standing to the rear of the crosswise rocker cable stretch, so that the brake-rocker pull shortens the cross stretch of the rocker cable, and makes an exactly even brake application on the two rear hub drums.

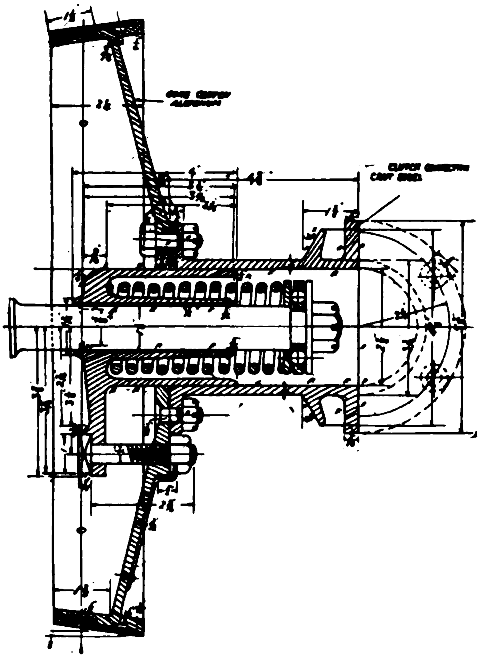


Fig. 9. Woods Clutch, 6 arms, 1¼ in. wide by ¼ thick. The leather faced cone clutch continues to be placed in work of the highest class, despite the vogue of the multiple disk. This is an example of the latest cone clutch designing, intended to be as good as can be made.

THE CARBURETOR.

See illustration. This is one of the latest and most elaborate forms of this important detail, and has been developed by a long series of experiments and changes, and is now in form to meet the most abrupt changes in volume of motor supply demanded with a mixture of uniform quality. The body of this carburetor is of bronze, and the finishing of the parts is of the very best workmanship.

The Woods Company intends to produce the best touring car that can be made, amply powered, all running and driving details of the best design and material, everything built by their own workmen in their own factory, from their own drawings and under their own supervision.

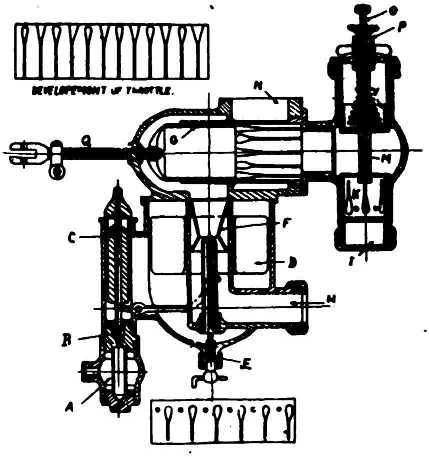


Fig. 10. Woods Carburetor.

A, Gasoline inlet and strainer.
B, Silver point needle valve.
C, Gasoline level adjustment.
D, Float.
E, Gasoline adjustment.
F, Choker tube.
G, Balance throttle.
H, Main air inlet.
I, Auxiliary air inlet.
K, Auxiliary air valve.
L, Dash pot.
M, By pass for vacuum in dash pot.
N, Outlet to engine.
O, Stop for maximum lift of air valve.
P, Spring adjustment.
Q, Throttle rod.

This carburetor has been developed in connection with the Woods Motor Vehicle Company's work, and is a very carefully worked out and well-built construction.

This first-class chassis is fitted with any style of body the purchaser may select. The 9-passenger body shown in the illustration is standard, but a wide variety of body designs is offered, and individual preferences of purchasers can be fully met, with productions second to no others of either American or foreign construction.

The Oscar Lear Co. Expands

The Oscar Lear Automobile Co., Columbus, Ohio, makers of the Frayer-Miller air-cooled cars, have accepted an offer of the Zanesville, Ohio, Board of Trade of a ten acre lot of ground and $100,000 cash invested in the company, and the capital of the Oscar Lear Co. has been increased from $30,000 to $150,000. The erection of the new plant will be started within thirty days. It is expected that six large one-story buildings will be put up and the factory fully equipped in time to start the production of a large number of 1907 cars by July next. Meanwhile the company will continue to produce Frayer-Miller air-cooled cars in their Columbus factory.

A. G. Ehmann recently severed his connections with the firm of Ehmann & Hobson, Fresno, Cal., and accepted a position as traveling coast representative with the Geo. P. Moore Co., San Francisco, Cal., manufacturers and importers of automobile specialties.

Theodore P. Meinhard resigned the position of assistant superintendent of the automobile department of the St. Louis Motor Car Co., and on March 1 assumed the duties of manager of the Motor Vehicle Garage Co., Buffalo, N. Y.

The entrance period for the French tire contest has been extended to May 15, as there was only one entry up to the date of closing the entries, whereas the conditions called for five. The entrance fees have also been doubled.

Do You Know

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Yale
Bicycles
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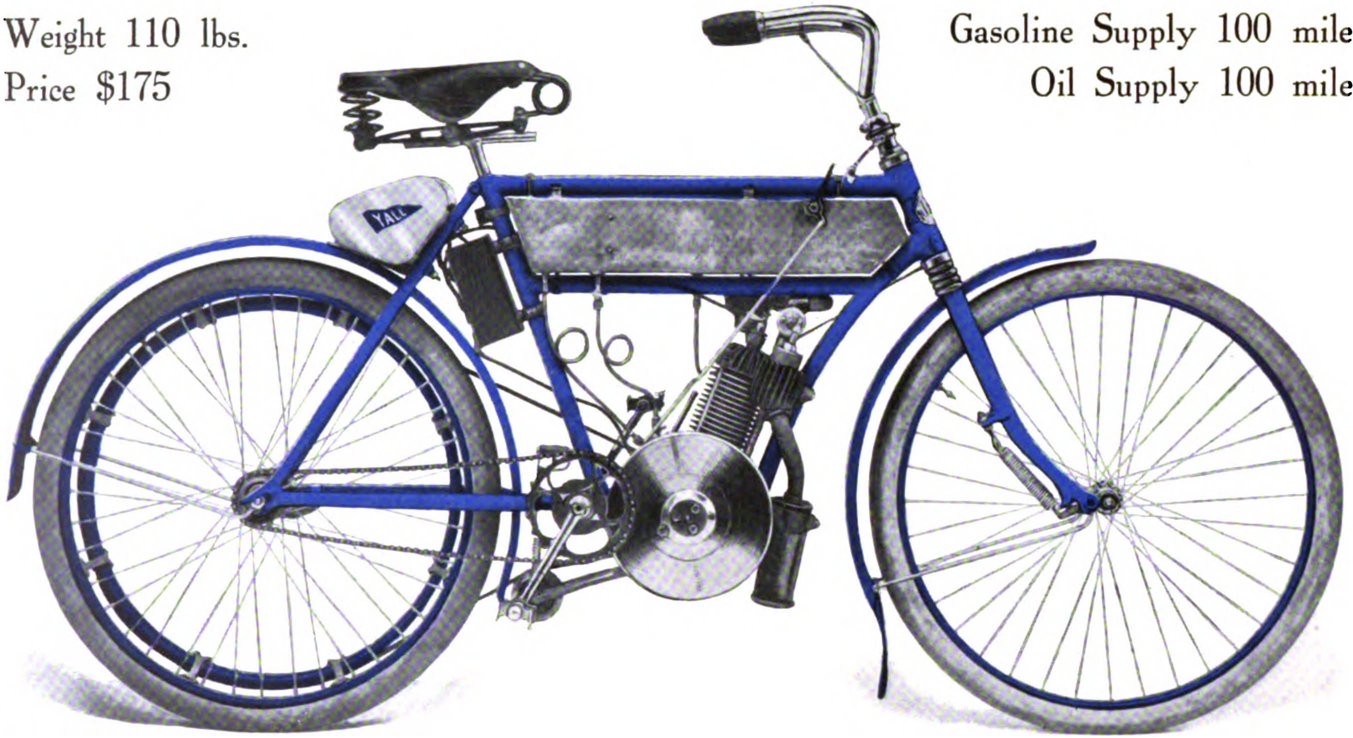
Yale
California
Motor-Cycles

Notice the next page

Weight 110 lbs.
Price $175

Gasoline Supply 100 miles
Oil Supply 100 miles



YALE-CALIFORNIA MOTOR CYCLES
BUILT BY
THE CONSOLIDATED MANUFACTURING CO.
TOLEDO, OHIO

The Moore Ball Bearing Car

By E. P. CLARK

(Continued from page 168d March Issue)

The cooling water enters the jacket immediately around the exhaust valves, thus giving the greatest cooling effect to that part of the cylinder which has been most heated by the escaping hot exhaust gases; it then passes around the sides and across the top of the cylinder to the opposite side and passes out near the inlet valve. The arrangement is such that it is impossible for any steam to be entrapped or the jacket space to become "air bound."

The entire surface of the cylinders within the jacket exposed to the water has a deposit of copper over it, which entirely prevents oxidization and keeps the water clean, as throughout the circulating system the water is only in contact with copper or bronze.

The upper half of the crank case supporting the cylinders and carrying the crank shaft bearings is made of manganese bronze of a tensile strength of 72,500 lbs. per square inch, carefully webbed and trussed to withstand any strains and shocks transmitted to it by the engine. The ball bearings for the crank shafts are seated in this and held in place by bolted caps also of the same manganese bronze.

The lower half of the crank case, which acts merely as a cover for holding the oil for lubrication and which carries no load or strain, is made of aluminum. It is divided into four compartments to insure each crank pin and cylinder getting a good supply of oil. Suitable drain plugs are also provided for emptying the crank case.

The pistons are fitted with four eccentric piston rings. Below the bottom ring a recess is cut in the piston to wipe off any oil into the center of the hollow wrist pin and bearings, rather than permitting it to pass into the explosion chamber and carbonize or soot up the plugs.

This construction has been found by experience to be most effective in this respect, and almost entirely does away with a smoky exhaust.

The wrist pins are hollow and of oil tempered chrome nickel steel, hardened and ground and have fully double the surface ordinarily provided for them, thus ensuring long service.

It will be noticed that the connecting rod is pinned to wrist pin and that ends of the wrist pins turn in the bosses on the piston instead of the usual construction. This gives a considerably larger surface, and is more easily lubricated by the oil swept up the cylinder wall. Further, being nearer to the jacketed cylinder walls, they have a greater tendency to give off any heat to the cooler cylinder walls, and are therefore less liable to become heated and seize. This method also gives a much better support to the wrist pin, as it reduces the length of the unsupported part of the pin, and reduces to a minimum the chance of breaking or cracking the wrist pin.

The I section connecting rods are made of special high grade of chrome nickel steel, oil tempered and annealed. Their lower end have a spherical bearing on the upper half of the crank pin brass, which enables it to adjust itself should there by any slight misalignment and ensures the brass always bearing uniformly on the crank pin throughout its entire length.

The lower half of the crank pin brasses are made integral with the cap itself, and are bolted to the connecting rods with the usual bolts secured by castellated nuts.

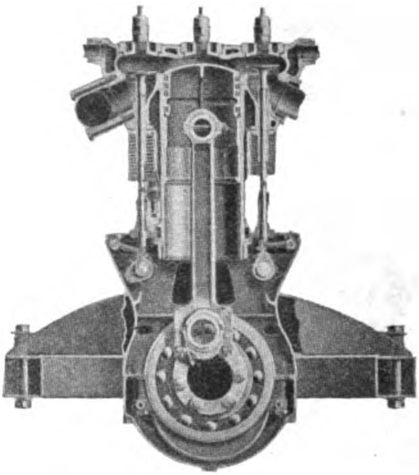


Fig. 4. The Moore Car, vertical section through one cylinder, showing inlet and exhaust valves, short levers riding on cams and carrying lifter rods. Ball bearing of crank shaft with the yoke holding same to upper half of crank case. Hollow crank and wrist pins. Note very long and light piston, and extreme length of valve rod guides.

This lower cap extends only for about one-half the length of the crank pin, so that at each revolution of the crank the uncovered portion of the crank pin dips into the oil in the bottom of the crank case or is splashed by it and thus distributes the oil over the crank pin.

In addition to this the bottom brass has two scoops which descend close to the bottom of the lower case cover and splash the oil to the crank pin, as shown by Fig. No. 4. It will be noted the brasses are slightly recessed at this point to prevent them pinching the crank pin and allowing the oil to distribute itself sideways.

The crank shaft is made of special oil-tempered chrome nickel steel, and is of special construction to adapt it to the introduction of separate ball bearings between each cylinder.

This shaft is of the built up type, consisting of a series of individual U-shape cranks of identical construction, turned from the solid, and bolted together, with male and female members, and are provided with a series of collars for the ball race ways, these raceways being held in place by the collars of the different cranks. The front end bearing section is extended, reduced in diameter, and provided with a spiral gear for driving the cam shafts, and the rear section is arranged for the fly wheel to be bolted to it and to carry the clutch cone and springs and is clearly shown by sectional drawing, Fig. 3.

The fly wheel is a steel casting provided with fan blades for circulating the air through the radiator in addition to the fan placed immediately behind the radiator.

Both the crank pin and the ball race-way bearings are made hollow to reduce the weight. The crank shaft construction is clearly shown by Figs. 3 and 4.

These five ball bearings in which the shaft revolves are bolted by suitable caps or covers to the upper crank case, which, being made of manganese bronze, gives them a firm and rigid support.

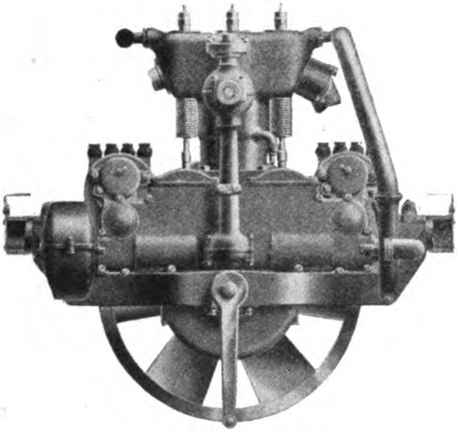


Fig. 5. The Moore Car, front view of engine. The magnetos on each side, inlet valves at the left, exhaust valve at the right. The column shown in the center at the front carries the fan and the commutator. (Fan not shown in this view.)

The crank pins are integral with and form a part of the individual sections of the crank, and have nearly double the amount of bearing surface usually thought necessary.

Special caps and bolts for securing the crank shaft and ball bearing race-ways to the upper manganese bronze crank cases are provided, which are easily accessible by removing the aluminum base. Notwithstanding the adoption of separate cylinders and five ball bearings shown, this motor is considerably shorter and more compact than engines of the same size hitherto designed with cylinders cast in pairs and having only three plain bearings of ordinary construction.

Both the inlet and exhaust valves, which are made of 35 per cent. nickel steel, are mechanically operated and interchangeable, being operated by the two cam shafts on opposite sides of the engine; they are easily and quickly accessible through separate valve caps shown in Figs. 2 and 4.

Each valve stem is provided with an adjustment by means of thin spring steel washers, so that the upper and lower spindles can be kept in exact contact as the valve stems lower, due to the grinding in of the valves from time to time.

The valve stems are lifted by small hardened steel rocking arms pivoted in the cam shaft covers. This construction reduces to a minimum the weight of the moving valve spindles and removes all side thrust.

The lower part of the valve stems are encased in separate covers screwed into this cam shaft cover, and are held down against the lifters by small spiral springs and can be removed independently from the cam shaft cover if desired. This construction is clearly shown by Fig. No. 4.

The cam shafts and cams are of oil-tempered chrome nickel steel, made in one piece, and are turned out of the solid, the cams being oil tempered and drawn.

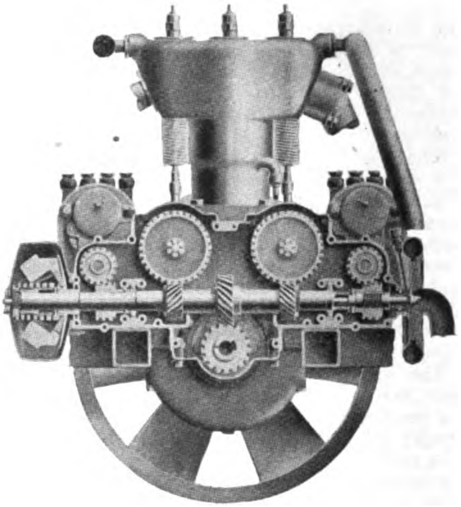


Fig. 6. The Moore Car. Section of gear case at front end of engine showing spiral gears driving cross shaft from crank shaft and two pairs of spiral gears driving cam shafts from cross shaft; also the spiral gearing driving the two magnetos from the centrifugal governor which controls the spark advance from these magnetos. Note the spring of this governor which is of graduated section, the coils at the left being light and yielding readily to the pressure of the governor weights, but those following being of increasing stiffness, the effect of which is that the spark is rapidly advanced at first as the engine speeds up but advances more and more slowly as the higher speeds are attained.

The cam shafts run in ball bearings and are always thoroughly lubricated by the splash from the crank case.

The cam shafts are driven by a cross shaft from the main shaft of the engine by means of two hardened spiral gears mounted on them. The gears are thoroughly enclosed and within the main crank case, and are at all times in an oil bath. These are shown by Fig. No. 6. This arrangement has many advantages, being more durable and quiet than the fibre gear ordinarily employed, and always protected from dust and undue wear. The cam shafts being run in opposite directions, the end thrust of the counter-shaft is counterbalanced.

LUBRICATION.

All parts of the engine are oiled by splash from the crank case, the supply of oil being fed into the crank case at any rate that may be desired by a single gravity sight feed located on the dash-board, and which can be adjusted at will. The supply to the sight feed is maintained from a two gallon oil tank located beneath the hood of the engine, and this sight feed located on the dashboard has an indicator showing the level of the oil in the supply tank.

A stand pipe in the lower crank case maintains the level at a maximum uniform height, determined to be the best by experience, and tends to prevent a smoky exhaust in case too much oil is fed.

A series of inclined troughs or lips, shown by Fig. No. 5, are cast on the sides of each of the front and back sections of the upper crank case, into which this case is divided by the cylinder and bearing supports, so that in ascending a hill a good supply is insured to the front cylinders and crank pins and vice versa in descending. Any surplus oil splashed against the side of the front crank case section is drained to the spiral gears driving the cam shafts, magnetos and fan, and then descends to the bottom of the crank case to be again splashed.

IGNITION.

A triple system of jump spark ignition is provided, from two high tension magnetos and coil. One magneto is located on each side of the engine and driven by spiral gears from the same cross shaft that drives the cam shafts.

The magnetos are supported by brackets cast on the upper crank case. These brackets have grooves on the upper side which fit corresponding grooves on the bottom of the magnetos and ensure their being always in line. The end of the magneto shaft is provided with a slot which engages the spiral gear, and either of the magnetos can be removed by simply taking out the four bolts holding them in place.

This slot in the end of the magneto shaft is so arranged that it can only engage and be put back in one position, and ensures the magneto being put back in its proper "timing" position, after this has once been fixed by the manufacturer. There is, therefore, no question of retiming in event of the magneto being removed at any time for repairs or overhauling.

Ordinarily the two magnetos work together, and each is provided with a separate set of spark plugs, one set located over the inlet valves and the other over the center of the cylinders or over the exhaust valves.

In addition to the above, a coil and storage battery are provided for starting, etc., with a third set of spark plugs.

There may, therefore, be three distinct and separate sparks in each cylinder, ensuring a rapid "firing" of the mixture and producing a maximum of power.

Any trouble with one of the magnetos, therefore, would not interfere with the proper working of the machine, and it can be removed and repaired at any convenient time.

The advance of the spark is automatically controlled by a governor located on one end of the cross shaft driving the cam shafts.

The spiral pinions which engage the gears on the magneto shafts are made with an extra wide face, and are arranged to slide on a feather upon the hollow cross shaft. Through this hollow shaft the gears driving each of the magnetos are connected together as a unit and properly timed.

The governor is connected with these gears, and as the speed of the engine increases or decreases causes them to slide forward or back on the feather on the hollow cross shaft, and this movement, owing to the nature of the spiral gear construction, causes an automatic advance or retardation of the spark. A similar connection is also made to the commutator, so that this and the magnetos are all given the same amount of advance.

The governor spring is of a special construction, so that it causes a rapid advance of the spark at low speeds and gradually becomes less and less rapid as the speed of the engine increases. This is a very important feature, as all attempts in this direction heretofore have been directly proportionate to the increase of speed of the motor, which is obviously wrong. The magnetos and commutator are also interconnected, so that the advance and retardation of the spark can be effected from the steering wheel.

The commutator is placed on top of the vertical shaft driving the fan, where it is easily accessible.

All high tension wires to the engine are enclosed in copper tubes, and contact with the spark plugs is made by push or knife switches to enable each plug to be quickly and easily tested and any plug removed without having to remove any small nut liable to become lost.

The low tension switch wires are also neatly enclosed in a copper tube, and are led to the bottom of the steering post and connected with the key switch.

A triple key switch located on top of the steering wheel enables connection to be made to either or both the magnetos or the coil at any time by inserting and turning this key. It is so arranged that both magnetos and commutator can work together or separately.

A safety plug or switch is also provided by means of which the current from both the magnetos and coil can be instantly shut off.

CONTROL.

The control of the motor is by means of the throttle and spark advance lever, also located on the steering wheel. The movement of the levers being independent of the movement of the steering wheel are always in the same position when shut off or full open, whatever may be the position of the steering wheel. The magnetos and commutator being connected together, the movement of the spark advance lever always advances or retards them alike.

The clutch pedal is interconnected with the throttle valve in such a manner that the withdrawing of the clutch automatically cuts down the supply of gas to the cylinders and prevents the engine from racing when the power is thrown off without the necessity of operating the hand throttle.

The carburetor of the Moore car is an original and ingenious piece of apparatus, and is claimed to insure a perfect and uniform mixture at all speeds and loads of the motor. Details are not available at present, as the applications for Letters Patent are still pending.

COOLING SYSTEM.

The cylinders are water cooled, the circulation being maintained by a centrifugal pump running on a ball bearing and attached to the end of the hollow cross shaft driving the cam shafts by means of a frictional driving connection held in operative engagement by means of a spiral steel spring, the arrangement being such that in the event of the pump becoming clogged by sediment or any foreign substance the frictional driving arrangement will slip and no damage will result. The pump is attached to the cross shaft at the end opposite the centrifugal governor, and is bolted to the upper crank case. Like the magnetos it can be entirely removed by unscrewing the two bracket bolts attaching it to the crank case. By unscrewing a single nut the cover can be taken off the pump and the pump runner removed.

The radiator is of a zigzag, cellular type, which insures a better distribution of the water, and is claimed to be less liable to become choked than the ordinary square tube cellular type arranged vertically. Care has also been taken to see that sufficient water space is provided.

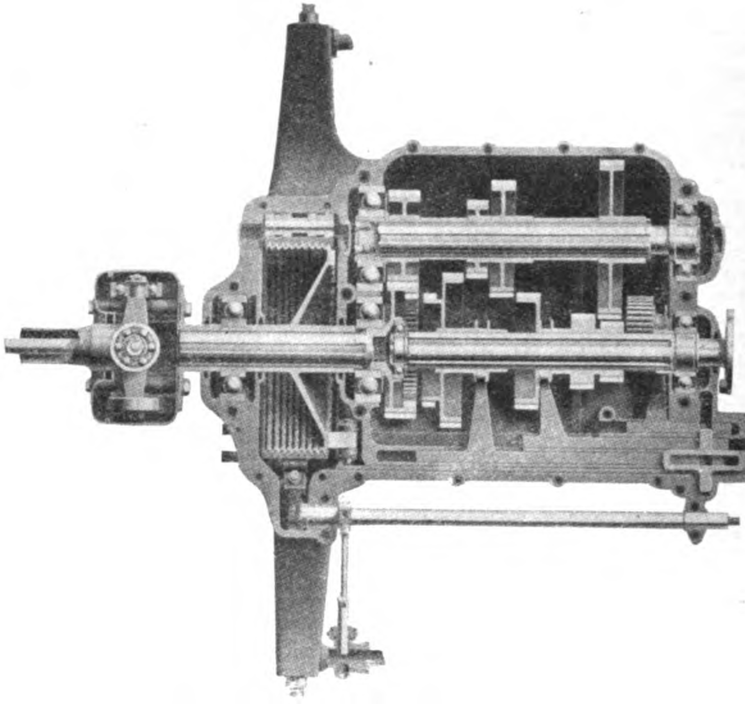


Fig. 7. The Moore Cor. Section of transmissio gear case, transmission brake and universal joint. All bearings "Hesse-Bright" balls, the valve admittin water to the brake drum is shown at the bottom of cut, the teeth of the ratchet sprag action are seen on the edge of brake drum nearest gears. The torsion member and its rigid surrounding sleeve comprising the elastic driving shaft are seen at the extreme right. Note grooved brake drum giving ver large surface, also note the ball bearing universal joints used.

The water connections are of copper pipes of ample size, graduated in size proportionate to the water passing through them and with easy bends to reduce the work on the pump to a minimum. Both the inlet and outlet pipes are attached to the cylinders with screw flanges, so that they can be easily disconnected, rubber connections being interposed between the engine and radiator and the radiator and pump. A strainer is fitted to prevent all sediment from entering the circulating system.

The fan is gear-driven through a vertical shaft and bevel gears from the same gear that drives the cam shafts. This vertical shaft is the one mentioned above as carrying on its upper end the commutator, and runs upon ball bearings enclosed in an oil and grease or vaseline bath; it requires, therefore, no attention, and is always thoroughly lubricated, and has no belt exposed to dust and liable to stretch and require adjustment. The engine cylinders are connected by copper drain pipes, the forward cylinder drain pipe leading into the drain pipe from the radiator at its lowest point. Into this leads also a drain from the centrifugal pump case and from the water jacket pipe of the shaft brake case, and by opening a single cock or valve the entire system, engine, brake drum casing, centrifugal pump and radiator can be drained, thus obviating the necessity of opening a series of valves as is the usual case, the neglect to attend to any one of which might result in the bursting of the cylinders by freezing.

A connection is also made from the back end of this drain pipe to a guage on the dashboard to show that the water circulation is properly maintained by the pump.

The steering gear is of the irreversible type with double screw arrangement without any lost motion. All thrust is taken up by the ball thrust bearing. The adoption of ball thrust bearings makes the wheel much easier to turn and entirely prevents the possibility of binding. Means are provided for the proper lubrication of this ball bearing. The double screw gear is also thoroughly lubricated at all times by the grease contained in the case, introduced through an opening provided for this purpose.

The steering lever and rod, as well as the equalizing rod, are made especially strong and heavy, and the equalizing rod is placed back of the front axle to protect it as much as possible.

The 3 armed steering wheel can be tilted in either direction without in any way interfering with the control levers or starting switch, as it swings on hinges on the two arms opposite each other by releasing the pin of the third arm, a very strong form of construction.

THE CLUTCH.

The clutch is of the metal to metal type, self contained within the hub of the fly wheel, is completely enclosed and runs in a bath of oil.

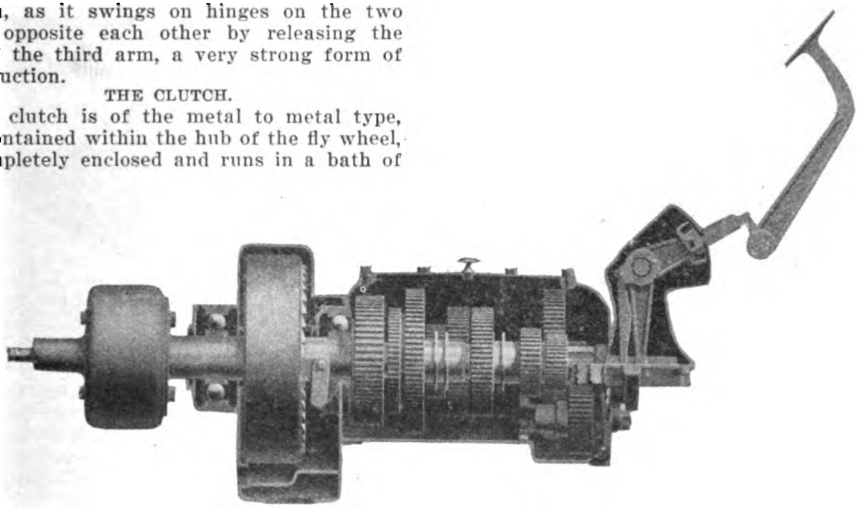


Fig. 8. The Moore Car. Side view of transmission gears with the case in section, showing also the ratchet sprag and the interlocking mechanism connecting with pedal.

The clutch proper consists of a double cone disk of chrome nickel steel, hardened and ground, and is very thin and light. This engages exteriorly a hardened steel bushing set into the fly wheel. An expanding steel ring set out by a cam or lever, engages the clutch on the inside, expanding the clutch cone hard against the steel bushing in the fly wheel and slightly expanding the cone clutch against it.

In disengaging the clutch, the action is to mechanicaly compress the internal expanding ring by sliding it up a slight incline, thus positively relieving the clutch and preventing it getting bound or "gripping."

As all the contact surfaces run in a bath of oil, its action is very soft and velvety, and even if the clutch is thrown in suddenly its action is not harsh, as the film of oil has to be pressed off the contact surfaces before it grips positively.

The clutch case is connected through the hollow crank shaft with the crank case, so that there is always a supply of oil or oil vapor to the clutch.

The clutch is held up by a double spiral spring completely enclosed in grease, the end thrust being taken by a ball bearing supported at the rear end by a ball revolving on the tail shaft of the engine as shown by Fig. No. 3.

The clutch disengaging fork, operated by the foot pedal, has two ball bearings with conical contact surfaces, which roll without friction upon a similar conical surface on the clutch cover.

A double universal and sliding joint also completely enclosed is placed between the engine and transmission case to provide for any twisting of the frame or misalignment of the mechanism. In fact, in assembling these they could be put considerably out of line without affecting the working of the machine in any way. These joints are made of nickel steel, and are completely enclosed in a dust-tight cover filled with grease to thoroughly lubricate all the bearings. The clutch shaft slides upon the sliding joint within the universal as the cone is engaged or disengaged.

TRANSMISSION.

The transmission case is of manganese bronze, the gears being made of a special chrome nickel steel having a very high tensile strength (200,000 pounds per square inch), and elastic limit of 130,000 pounds per square inch, hardened by special process and having great wearing qualities.

The gears are cut out of the solid and the teeth, which are of a special shape, of very strong section, are cut by the most modern of gear-cutting machinery and ground by a patent process after hardening. The edges of the teeth sliding into contact with each other are carefully rounded on their entering edges.

The two sliding gears affecting the different changes of speed slide on the main shaft on an accurately fitted multiple or sextuple feather, and have therefore ample wearing surface and are less liable to have play than with the squared shaft usually fitted.

The gears are brought into contact or mesh by means of three sliding rods, entirely enclosed within the transmission case, and which have no ends protruding from which oil can leak.

All gears not in mesh are positively interlocked. This construction is shown by Fig. 7. The fixed gears on the counter shaft are also fitted to it by a sextuple feather, and are positively held in their places against shoulders and by the necessary sleeves between the different gears; to remove the gears it is only necessary to remove the cover, lift out the shaft and slide the gears off.

Ball bearings are fitted throughout the transmission case, lubrication to them being provided by having a suitable cavity or recess for the introduction of vaseline. Once supplied with this lubricant, they will run for months without requiring further attention.

These bearings are partitioned off from the main case and protected in the event of any small particles of the gears being chipped off in the continued changing of gears. An inspection cover to the transmission case is provided through which the case can be filled with oil from time to time or the gears examined. Four speeds and one reverse are fitted.

The drive is made direct upon the third speed, and no others are in mesh doing work during this time. On fourth speed, therefore, the speed is accelerated above the engine speed. Incidentally this construction reduces the size of the gears, which has additional advantages. The change speed lever is provided with a button on top to prevent it going into reverse. All other changes of speed being effected by simply pushing or pulling on the lever.

Stripping the gears is prevented by means of an interlocking device, which necessitates the clutch being completely withdrawn before the hand lever can be moved, and which allows the clutch to be put into engagement as soon as the gears are in mesh, as shown by Fig. No. 8.

An automatic sprag of the pawl and ratchet type is provided, the pawl acting upon the ratchet teeth cut in the side of the brake drum of the main shaft. It is so arranged that it acts by gravity instantly the car stops and prevents the car running back if it happens to stop on an incline without the necessity of applying the brakes, allows the car to be started on any incline with great ease and prevents the necessity of a double and simultaneous manipulation of the clutch and brakes.

This sprag acts automatically in all positions of the change speed lever except the "inside neutral" and "reverse," in which latter positions a small lever, by sliding up an inclined cam on the change speed lever, withdraws the sprag and permits the car being moved in either direction. Even on the garage floor the car cannot be run backwards unless the lever is in the latter position.

Two foot pedals of the push type are fitted. The left pedal controls the clutch lever, the bottom fork having ball bearings which have conical surfaces which roll on a suitable conical surface on the clutch casing when the clutch is disengaged and works entirely without friction and consequent wear.

The right pedal controls the brakes and is arranged to work both the brake on the main shaft and the emergency brakes on the rear wheels. When operated by the pedal the brake rods are fitted with an adjustable spring attachment, which can be adjusted so that the wheels will not skid upon a dry road, which prevents the tearing of the tire shoe and greatly increases the life of the tire. It also divides the work between the three brake bands, preventing excessive wear of any one of them. The emergency brakes can also be operated by the brake lever in the usual manner.

THE BRAKES.

There are two brakes, both very powerful and double acting.

The brake drum on the transmission shaft is located immediately back of the transmission case, is mounted between two ball bearings and forms in reality a part of the transmission case. This brake is very powerful, and has a very large surface, consisting of a series of V grooves in the brake band, which engage in a series of similar grooves in the brake as shown by Fig. 7. The brake is set by a cam-like arrangement, which is designed to work with a uniform leverage as the brake is applied.

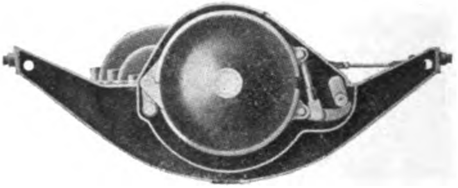


Fig. 9. The Moore Car. End view of gear case showing brake drum and brake shoes with the toggle action of the latter and the cam which actuates them. The long arms extending to either side from the rear end support of the gear case, the front end being supported by a single sling as described in the text.

The brake is completely enclosed from dust and dirt and runs in an oil bath, which is cooled by water circulated by the centrifugal pump supplying water to cool the engine. This cooling action continues, therefore, without waste of water so long as the brake is in operation, and is not dependent upon a limited supply from a tank. A small valve is fitted near the rear end of the gear box, which is controlled by the shaft operating the brake pedal and so arranged that when the brake is applied the valve is opened and a portion of the water, circulated through the engine by the centrifugal pump, is allowed to circulate around the brake drum. As soon as the brake is released the valve is closed and the circulation stopped.

The emergency brakes on each of the rear wheels are of the internal expanding type, and are also completely enclosed from dust and dirt and are clearly shown in Fig. No. 11.

THE DRIVE SHAFT.

The clutch and the universals of the engine and drive shafts are completely enclosed in oil and dust-tight cylindrical covers, turned smooth upon the outside and free from any projections liable to catch up loose objects and wind them around the shafts.

Great attention has been paid to all such minor details, and there is no reason, with a little care, why all parts of the machine cannot be kept as neat and clean as a stationary engine in an engine room, and thus considerably increase the life of the machine.

The power is transmitted from the gear box to the rear axle by means of a patented "compound" flexible shaft of chrome nickel steel, spring tempered. This shaft is provided with two enclosed grease-lubricated, dust-proof universal joints, one at each end, a sliding universal connection mounted on ball bearings being provided at the front end.

The main transmission shaft is so designed as to allow for a certain amount of twisting or torsion between the transmission case and rear axle, so that a sudden throwing in of the clutch or any road shocks are not rigidly transmitted to the mechanism as is the case with the ordinary construction.

Providing the load is not too great, all the power is transmitted through this elastic member, but before the load becomes so heavy as to overstrain the flexible shaft the external hollow shaft takes up the load.

It has been quite widely claimed that for moderate loads and powers the bevel gear and "propeller" shaft is superior to the side chain drive on all points except that of elasticity, in which respect the side chains are considered to have an advantage.

The above system of drive entirely overcomes this last defect and is in reality more elastic and causes less shock to the mechanism than the double chain drive. In fact, with the double chain drive the tendency in running over the rough roads or into the holes or depressions is for the rear wheels to run ahead and take all the strain or pull off the chains, and then the driving sprockets to suddenly run ahead and quickly put full strain on the chain. This causes a whipping or snapping of the chains, and brings about considerable shock on the mechanism, as it is plainly evident that the chain itself is not elastic. Further, the very short chain now used since the general adoption of side entrance bodies practicaly does away with most of this so-called elasticity, due to the sag of the pulling side.

In the action a compound elastic shaft referred to above, there is always a torsional tension in the shaft, and there can be no considerable shock to the mechanism until this is all absorbed and the direction of torque reversed. In this manner the road shocks are absorbed practically as if a spring drive were interposed, and the shock to the mechanism becomes very much less than is possible by any of the inelastic forms of chain drive or ordinary rigid bevel gear drive.

The main bevel gear and pinion, and the spur gear differential, are located in a spherical case in the middle of the rear axle and are mounted upon a separate and independent shaft provided with ball and thrust bearings and run in a bath of oil.

These gears can be quickly inspected by removing the cover of the rear axle casing and can be entirely removed by taking off the ball bearing caps holding this shaft in the rear axle casings, as shown by Fig. 11.

The small bevel drive pinion shaft, which is contained in a housing bolted to the spherical casing of the rear axle, rotates upon two ball bearings contained within this housing, and can be taken down by removing the bolts holding this to the rear axle casing.

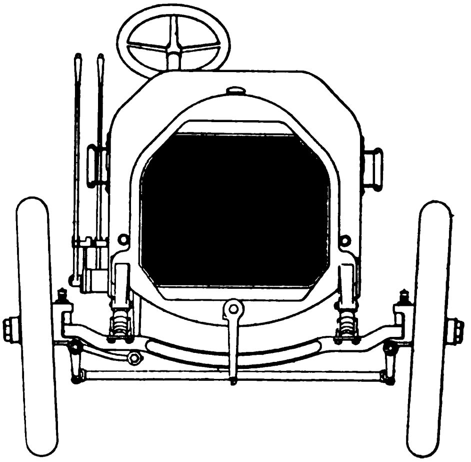


Fig. 10. The Moore Car. Front end view; note strong construction of steering knuckles.

All of these gears are of chrome nickel steel cut out of the solid and afterwards hardened by a special process.

The main bevel gear shaft has a multiple interior feather cut on it, in which engage two separate shafts, also feathered, the outer ends of which, by means of a forked spider, engage in the driven hubs of the rear wheels and propel the machine. All the weight is carried by the outer casings or dead axles.

Special attention has been given to the design and construction of the rear supporting or dead axle, which is made of a double conical hollow axle of chrome nickel steel, having a spherical portion, in the center of which the main bevel gear and differential gear are placed, and the outer ends support the frame and springs and the driving wheels, which latter run on ball bearings.

Attention is also called to the location of the springs, which are placed as close as possible to the wheels, reducing all bending strains to a minimum.

The hubs of all wheels run on ball bearings of ample size, which are provided with a reservoir or space for vaseline, which will run them for months without requiring further attention, and insures a minimum of loss by friction.

These ball bearings are forced upon a hardened steel sleeve, which fits the axles and upon which it can turn in the event of an emergency or any temporary disarrangement of the ball bearings, and means being provided for the proper supply from the reservoir of lubricant referred to above, would be quite as efficient as any form of plain bearing could be.

This construction has the further advantage that in the event of the removal of the wheels to examine the brakes or for other reasons the ball bearings are not disturbed and the entire wheel and sleeve comes off as a unit.

FRAME, SPRINGS AND THE MOORE SUSPENSION.

It will be noted from Figs. 2 and 3 that the motor is carried upon a rectangular tubular subsidiary frame, supported at three points, the two points at the rear end of this subsidiary frame being attached by circular bearings to a stiff tube extending between the sides of the main frame, and at the front end by swinging link and double pin support to the front steel cross member of the frame.

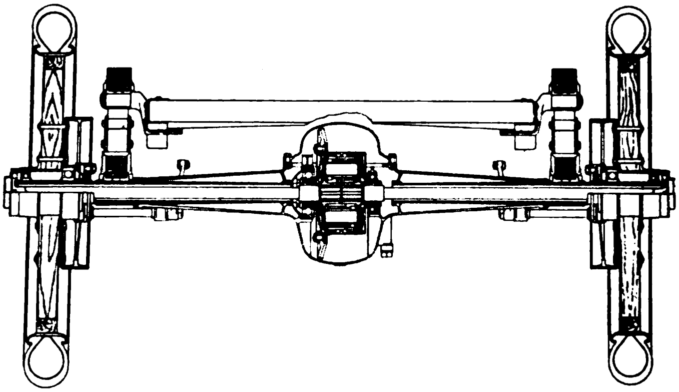


Fig. 11. The Moore Car. Sectional view of rear axle, bevel gear drive, spur gear differential, ball bearings, ball thrust, internal expanding hub brakes, casing of bevel and differential gearing has removable cover to allow of ready inspection.

The transmission case is suspended at its back end from the frame by two similar circular bearings, and the front end from a bracket on the tubular cross member supporting the engine by a swinging link and double pin support.

It will be seen that any deflection of the frame cannot set up any strains in the engine and gear cases. Both engine and gear box, being attached by these circular bearings, can slightly turn in these and adjust themselves lengthwise to any twisting or buckling of the frame by means of the suspension links.

It will be noted that the position of the engine is determined by collars placed upon the tubular cross member. Further, the introduction of a double universal joint between engine and gear box allows for any misalignment of the engine and gear box shaft in the event of these being put together improperly by inexperienced mechanics in overhauling the machine.

The two double universal joints interpose between the gear case and rear driving axle take care of any misalignment or twisting of the frame at this point.

The driving mechanism therefore consists of several independent main elements: Engine, front double universal and sliding joint, transmission case, shaft universal and sliding joint (sliding on ball bearings), a compound flexible drive shaft, rear universal joint and rear axle bevel gear drive, thus effectively compensating for any want of alignment of the driving mechanism through any cause.

Further, the engine shaft, transmission case shaft, and main drive shaft are slightly inclined to the frame or a horizontal line, so that when the car has its normal load they are in a straight line from the front end to the rear axle, and without the usual bend or inclination in the drive shaft, so that any friction due to the angularity of the drive and transmission and engine shafts and universals is eliminated and when the car passes over uneven roads the drive shaft oscillates equally each side of this straight line.

THE FRAME.

The frame is of cold pressed nickel steel with the side members of the truss pattern and with the cross members of tubular and Z sections.

The side members of the frame are provided with loops or eyes on the top flanges at suitable places for attaching the body to frame as well as the gasoline tank, oil tanks, steps, etc. Similar eyes are also provided on the bottom flange of side members for attaching the aluminum underbonnet, which extends the entire length of the chassis and thoroughly protects all the machinery from mud and dust.

The dashboard support is formed integrally with the frame by combining it with the cross member at this point by bending the flanges upward to form a support or frame to which the ordinary wooden dashboard can be bolted, and which gives a maximum of rigidity to the dashboard for supporting oilers, etc., without necessitating the use of separate angles. This gives a much neater appearance and reduces the weight to a minimum.

The following instruments are fitted to the dashboard: Water gauge fitted to the water circulating system; quadruple French coil; single sight feed lubricator connected to crank case; speedometer; revolution recording and registering tachometer; gasoline indicator.

SPRINGS.

The chassis is supported upon semi-elliptic springs at the front, which are placed directly under the chassis frame.

At the back end the springs are of the full elliptic type, with scroll ends with double links, giving a very smooth and easy riding car over the rough American roads.

The wheels are 36 inches in diameter, both front and rear, of artillery type.

The wheel base is 116 inches, giving ample length for double side entrance for any type of body.

The tires on both the front and rear wheels are 36x5 inches. Continental tires are fitted.

FRONT AXLE CONSTRUCTION.

The front axle is of "I" beam section, the strongest possible form, and unusually stiff and rigid, and its construction is shown by Fig. 10.

The steering knuckles have ball thrust and double ball bearings for rotating or turning, thus insuring easy turning of the wheel.

FUEL TANK.

The gasoline tank, which is located under the driver's seat, is made of seamless copper, is rigidly attached to the frame and has a capacity of 15 gallons. The filling opening is very large, allowing one to reach their hand and arm into the tank and clean it when required, and is provided with a cylinder or funnel of double wire gauze, between which a chamois filter is inserted which prevents any dirt sediment or water getting into the tank with the gasoline when filling. This funnel can be removed and easily cleaned.

The gasoline supply to the engine is taken from a pocket extending from the bottom of the tank, and is of ample size and provided with a vertical branch pipe leading to an indicator placed on the dashboard showing at all times the amount of gasoline in the tank.

The muffler is secured to the rear of the chassis frame and is of such size and construction as to not only kill completely the noise of the exhaust, but at the same time to cause as little back pressure as possible. A large pipe with easy bends brings the exhaust gas from the engine to the muffler.

The acetylene headlights are arranged to move and swing with the front wheels, so that the light is projected in the direction the car is going, whether in a straight or curving road. They are further so arranged that the movement of the lamps is somewhat more than that of the wheels and the light is therefore always projected upon the road which the car is about to traverse.

The weight of the complete chassis is about 2000 lbs. All necessary tools, spares, pump, jacks and accessories are carried outside the machine in tool boxes placed on the foot boards on each side of the machine or under the gasoline tank as desired.

The bodies are all made with double side entrance, and will be furnished in any style desired. The body work being arranged to completely hide the side of the frame adds much to the "carriage-like" appearance of the car.

All the bodies are fitted with double hinges attached to the rear cross member of the chassis, and by simply unscrewing the bolts fastening the body to the chassis, it can be elevated at the front end so that any part of the machinery can be examined.

The body is so designed and constructed that both the front and rear mud-guards and all the nicely painted parts lift with the body so that by tilting the body the machinery can be worked over without any possibility of the paint being scratched or damaged. The running foot-boards and steps being attached to the frame do not raise, leaving the tool boxes and tools required for working around the machinery in place.

By removing the hinge pins the entire body can be lifted off and a second body complete put on in its place in ten to fifteen minutes.

This feature enables two or more bodies being built for use on one chassis and the change made easily in twenty to thirty minutes' time from an open type of body for touring or day use to a closed type for theatre or other use in the evening.

This change can be readily made by arranging in the garage means for lifting off the body and suspending it from the ceiling, after which the chassis is run under the other type of body it is desired to put on and simply lowered on the chassis and fastened by the holding down bolts.

Every part of the machinery is designed with a view of being easily kept clean, and wherever possible is finished and with the body arranged by hinging so as to be readily raised. There is no reason why the entire machinery should not be kept as clean as an engine in a fine engine room, and this car, with its complete and well-thought-out design, should certainly give an excellent account of itself with anything like capable handling and care.

The Winton Motor Carriage Company are enlarging their factory at Cleveland and are also building new branches both there and in New York. The machine shop, now 300 by 100 feet, and the paint department, 400 by 100, will both be extended 25 feet on the south side and made into two-story buildings. The total floor space will then be 259,100 feet, or 34,000 square feet larger than any other automobile factory in the world.

A state automobile club association has recently been formed at Springfield, Ill., comprising the Springfield Automobile Club and the automobile clubs of Peoria, Bloomington, Decatur, Rockford, Austin and Chichago. Sidney S. Gorham of Chicago is president of the association, which now has over 1,000 members.

Thos. B. Jeffery & Co., Kenosha, Wis., who made the well-known "Rambler;" have recently made the largest shipment of automobiles on record. It consisted of a solid train of 17 cars loaded with surreys, 52 of which were Type 1, 14 Type 3, and 1 Type 2. The freight charges on this shipment aggregated $6,630.

The Harrison, A Car of Original Ideas

HUGH DOLNAR.

The Harrison Wagon Company, Grand Rapids, Mich., U. S. A., began in August, 1904, to build motor cars from designs by Mr. A. C. Menges, who became connected with the Harrison Company at that time.

The Harrison Wagon Company, incorporated in 1893, began as the Harrison Wagon Works, William Harrison Proprietor, Grand Rapids, in 1852, immediately gained prominence and has carried on a prosperous and constantly increasing business as manufacturer of farm and freight wagons and sleighs up to the present time.

The attention of the Harrison Company was attracted to the possibilities of the automobile in 1903, with the result of placing the first Harrison car, on the road in March, 1905. This first Harrison car had 94 ins. wheel base, a new form of sliding gear, some pronounced novelties of valve gear, and a carburetor from original designs by Menges, was thoroughly tried out, gave great satisfaction to its builders, and the construction of a second car was soon begun.

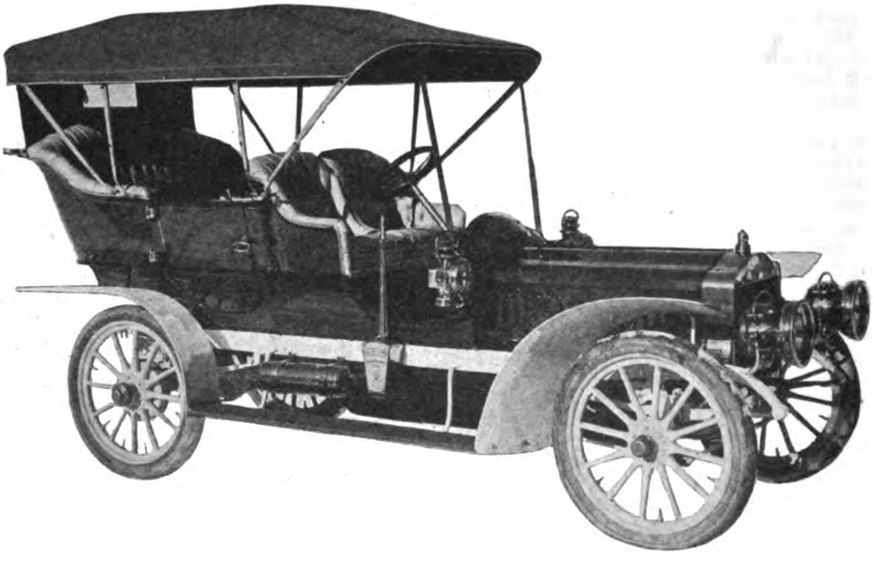


Fig. 1. Harrison 1906 Model B Touring Car: Wheel base 115 ins., gauge 56 ins., tires 36x4½ ins., motor 4 cylinders, 4¾x5 ins., 4-cycle, vertical, reversing and self-starting. Sliding gear speed change, all gears always in full engagement. Side entrance tonneau body, to seat seven passengers. Weight 2700 lbs., all on. Price $5000, including cape top, storm curtains, mats, horn, tools and five lamps, ready for extended touring.

This second Harrison car was completed and first shown at the 1906 Chicago show, where its striking originality of motor, speed change, control, and starting attracted great attention, Menges having approached all the principal problems of motor car construction from new points of view, and treated them with absolute originality, and having reached pronounced success in every particular by entirely novel chains of reasoning, embodied in new forms of motor, transmission and control, details which were examined by the leading American motor car experts with close attention and universal approval.

A. C. Menges, designer of the Harrison Cars, learned the machinist's trade in the shop of his father, who was a mechanic and inventor, and then served a three and a half year apprenticeship in an electrical establishment in Kansas City. Menges began work on gas engines by building a small 2-cycle motor to drive a boat when he was 18 years old, and worked steadily on gas engines of various types, both 2 and 4-cycle, water and air-cooled, trying many new devices, until his connection with the Harrison Company.

It will be noted that Menges had a practical training in electric construction, and that all his gas engines had original features of both construction and operation. The Harrison Company had no expert gas engineers, and Menges had a chance to carry out his ideas without hindrance, made a pronounced success of his first car built at the Harrison shops, and astonished American motor car experts by this second Harrison car, shown at the recent Chicago exhibition.

ORIGINAL FEATURES OF THE HARRISON CAR.

Menges has produced in the Harrison car a thoroughly practical reversing 4-cylinder 4-cycle gas engine, by introducing opposed side cams, one fixed to the cam-shaft and the other loose on the cam-shaft, hand adjusted to either of two positions. The intake valves are automatic, exhaust valves only mechanically operated.

(a) If the adjustable side-cams are turned one way the motor is reversed without changing the order of cylinder firing.

(c) If the adjustable cams are turned towards the reversing point the first result is to reduce the volume of charge intake.

(d) By moving the cams in reversing

direction gradually, the motor will stop before reversing.

(e) If the reversing movement is made with moderate rapidity from extreme to extreme, the motor reverses.

(f) If the adjustable cams are moved the opposite way to the reversing movement the motor is first weakened, and then at the extreme of this contrary movement the firing order is changed, making cylinders one and four fire together and cylinders two and three fire together, giving the pair of opposed cylinders crank-shaft impulses, which produces a stronger hill-climbing effect than when the cylinders are fired normally, one, three, four, two.

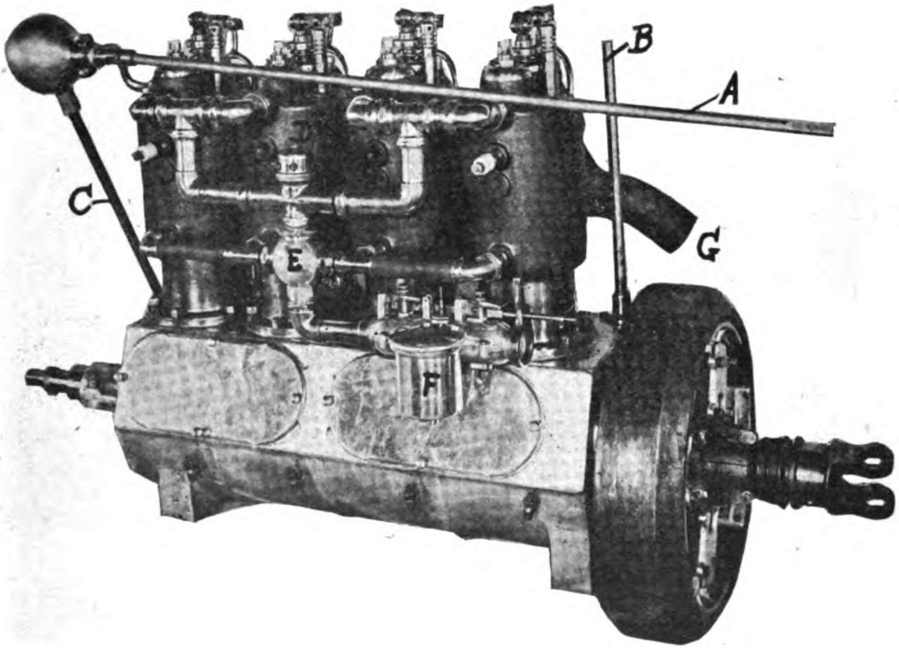


Fig. 2. Harrison motor, left side, showing carburetor, piping, air valve on supply pipe, and commutator and governor shaft. A, Governor and commutator shaft. B, Reversing and "Twin Firing" shaft. C, Bevel gear shaft from the cam shaft to drive A. D, "Pure" air valve, turned one way to pass mixture from the carburetor to the cylinders, and turned the other way to close the passage from the carburetor and admit pure air to the cylinders, to obtain the pure air charge to mix with acetylene gas for the starting charge. E, Water jacket around the vertical pipe from the carburetor to cylinders. Cylinder cooling water from the radiator, warm, and fills E, and surrounds a portion of the vertical part of the mixture pipe. F, Carburetor float chamber. G, Exhaust. H, Carburetor wedge slide, which carries three adjustable incline wedges, coacting with 3-levers to adjust the throttle valve, needle valve and air intake valve simultaneously by sliding the hand-adjusted wedge bar.

(g) A separate hand lever varies the exhaust valve lift, the maximum exhaust valve lift giving maximum motor power, and less exhaust valve lift giving less motor power.

(h) The carburetor air intake, the gasoline needle valve and the throttle valve are placed under control of one sliding bar, carrying 3 wedges, this wedge bar linked to the clutch and to a hand-lever, while the needle valve has an independent hand over lift, above the wedge lift, and the intake valve can automatically lift more than the wedge bar lifts it, so as to respond to a quick piston movement.

(i) The supply pipe from the carburetor to the cylinder, is jacketed, with the water going to the cylinder jackets, to slightly raise the mixture temperature.

(j) A hand opened pure air valve is provided, opening into the cylinder supply pipes, which fills the cylinders with pure air, used in running down hill, motor as a brake, no fuel used, and also with (k).

(k) Acetylene gas is piped from the gas tank to the cylinders, and, having the cylinders charged with pure air, opens a hand actuated valve which admits acetylene gas to the cylinders filled with pure air, forming an acetylene starting mixture.

(l) A supplemental commutator, double contact, stationary wires, contact always right for the start, is fitted when running no current goes to this supplemental commutator, but when the switch is moved to start, the supplemental commutator has current supplied to all four of its long fields; and the one in contact with the brush fires the proper cylinder, and thus makes a certain start. The acetylene must be added to a pure air charge. Any admixture of gasoline prevents the acetylene charge from burning properly.

(m) A jump-spark plug with self-cleaning terminals is used which has, so far, shown itself always effective, under all conditions of service.

(n) The clutch is an internal cylindrical surface finished inside the flywheel rim, engaged by four leather faced, radial, cone and lever actuated shoes, pedal engaged: these shoes have each a wear compensating short coiled spring, and a longer retracting coiled spring. The clutch engagement is soft and gradual, giving an easily managed slipping engagement, and the disengagement is clean and entire.

(o) The sliding gear speed change is wholly original and is ideal in action, all gears always in full engagement, no gears in motion on high speed, no gears in motion at any time save those driving the car, direct change from any speed to any other speed or to high gear, no friction engagement of surfaces, and the actuation includes no springs, latches or catches of any sort. The action gives three speeds forward and a reverse with the motor driven in one direction, or by reversing the motor, which, with Menges' valve gear is a ready operation, gives four forward speeds and three reverse speeds, seven speeds in all. Three gears are placed on the line shaft, and one loose gear on a sleeve concentric with the line shaft. The side shaft stands at one side of the line shaft and carries four gears, one fixed to the side shaft and three loose on the side shaft. There is also one reversing pinion on a third axis, making 9 pieces of gearing in all, the reversing gear being always in full engagement with its coacting gears.

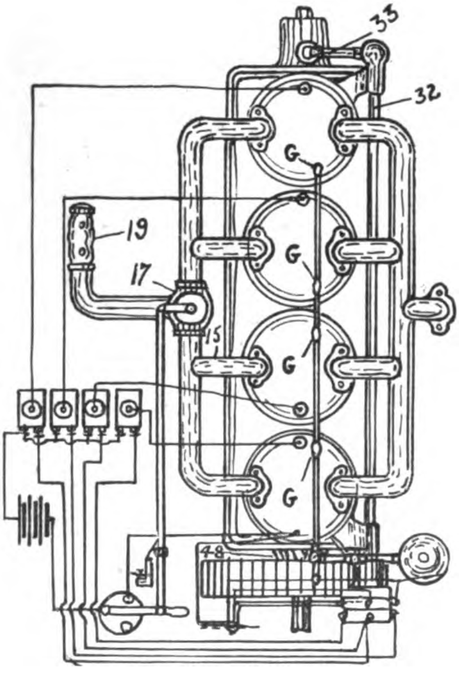


Fig. 3. Harrison-Menges ignition. This is from a patent drawing, and does not show the same forms nor the same reference letters as those of the reproductions of photographs taken from the motor itself, but gives the electrician the correct method of wiring. 19, Carburetor. 17, Air valve. 15, Mixture and air piping to cylinders. 27, Acetylene gas pipe, led by pipes to pipe gas to the cylinders as here shown, and place an automatic inwardly opening valve in G, over each cylinder to retain compression and resist the fired charge pressure. This plan was abandoned in favor of the 4-way cock elsewhere described, which does not need the automatic cylinder valves in the gas pipes. 33, Bevel gear shaft. 32, Commutator shaft, the commutator and the starting commutator are both in one commutator shell, inside the front board.

Finally, the diameters of coacting gears may be anything that will give the desired ratio and go into the gear casing, no gears save individual coacting pairs having any relative diameter limitations; this permits the making of all gears as large in diameter as the ratio and the gear box dimensions permit.

The line shaft is squared for 2 ins. of its length, and carries two solid-jaw integral clutches, while the separated tail shaft, 2, carries an integral clutch member, normally engaging the low-speed gear, but disengaged by the high-speed shift, so that on the high speed no gears are driven, though all gears, including the reverse pinion, are constantly in full engagement.

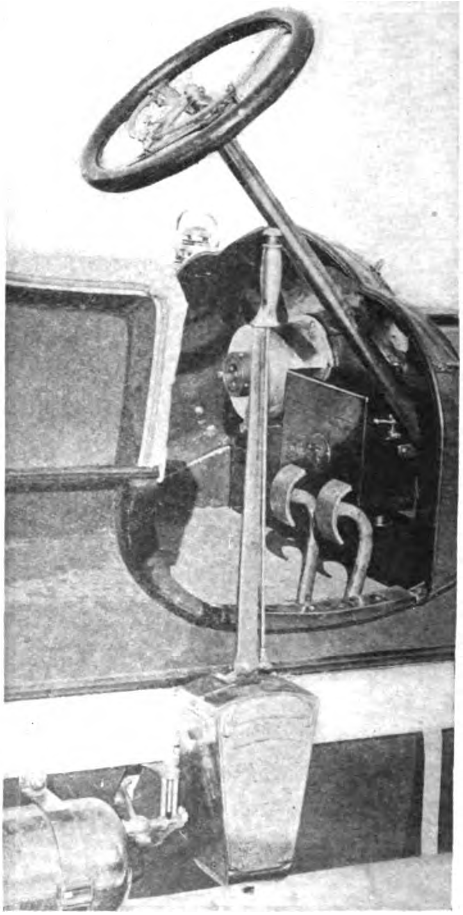


Fig. 4. Harrison Control. This does not show the final form, which has 3 pedals instead of two, as here. The coil box is at the right, inside the aluminum casting front board, and the commutator is at the left, also inside the front board. The single vertical lever is in an H-slot, and picks up and works a rocker arm on one side or a rocking sleeve arm on the other side, leaving either in locked position when changing to the other. This vertical lever makes all the change gear shifts, and automatically disengages the clutch when brought to the neutral mid-position, the clutch remaining disengaged until re-engaged by a separate pedal actuated movement of the clutch cone.

The side shaft has one gear fixed to it, and has two integral solid jawed clutches. Each co-acting pair of solid jaw clutches has one long jaw, which brings co-acting clutch jaws into registry, and makes engagement smooth and certain. The gear handling is such that all gears are free to revolve, before any clutch engagement can begin.

All speed changes are effected by the engagement of solid-jaw clutches; one clutch member of each coacting pair is always integral with a gear hub, and the other integral with either the side shaft or the line shaft. One single outside vertical lever in an H-slot, not linked to anything, engages either a rocker arm or a concentric rocker sleeve arm, locked when not operatively engaged, so as to work the change gear shifts.

(p) Menges journals the brake rocker on the rear axle sleeve, so that the brake rocker, and rear axle relative positions are not changed by spring flexure.

(q) Menges splits the rear springs in two lengthwise, and places four rear springs instead of two, one outside and one inside of each chassis frame side member, gaining increased spring range and flexibility, and also distributing his axle load support and his chassis frame supporting points, so as to obtain a better spring action, save room, and diminish the probability of fracture in all parts of the rear assemblage.

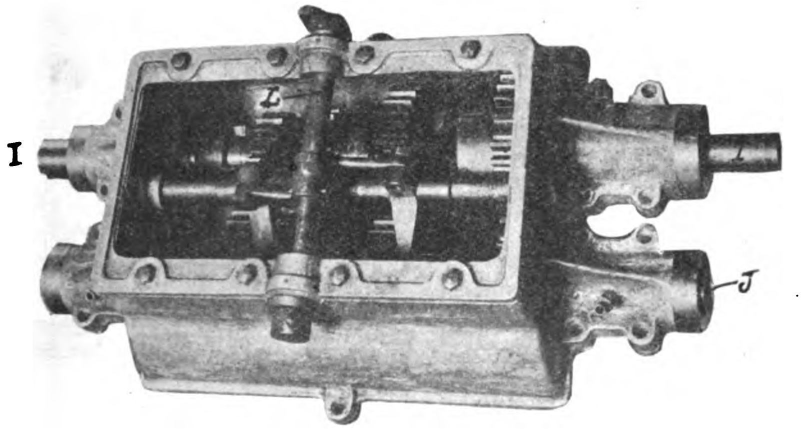


Fig. 5. Harrison Sliding Gear, top cover of gear box removed. L, Rocker sleeve, loose on the rocker; the sleeve and rocker have arms connected to the gear shifting lever actuated sleeve and rocker, so that either the sleeve, L, or the rocker on which it is mounted may be moved independently. The sleeve, L, is linked to the shifter marked S', Fig. 6, and works one pair of gears and a clutch at the right, Fig. 6. The rocker has fixed to it an arm linked to the shifter S, Fig. 6, to work the two left hand pairs of coacting gears, Fig. 6. I is the line shaft, J is the side shaft.

(r) Menges places the fuel tank under the driver's seat, and provides a globe ended, pull-out, brass filling sleeve, bayonet-joint retained; when this sleeve is pulled out a large filling hole is exposed in its upper surface, through which the gasoline tank can be filled from either side, on any grade, without disturbing the front seat passengers. A float in a column in the fuel tank has electrical connections which ring a bell when the tank is filled, and also when the gasoline supply falls to one gallon.

(s) A split pin drives the water circulating pump, and is the weakest member of this linkage, and if this pin is sheared by extraordinary pump resistance a ratchet alarm is sounded to notify the driver of the pump failure.

(t) A push button on the front board utilizes the spark coils to light the acetylene lamp from the front seat. The reader who has followed this long list of novelties will understand why the Harrison space in the Coliseum show was always crowded. Probably no one man carried away anything like a complete comprehension of Menges' motor car improvements, but all found wholly unexpected novelties, while the most advanced students of motor and car construction found ample food for thought in the subtle combinations devised by the prolific mind of Menges, previously unknown in the motor car world.

The specifications of the Harrison 1906 Model B Touring Car are: wheel base, 115 ins., gauge 56 ins., tires 36x4½ ins., motor, 4-cylinders, 4¾x5 ins., 4-cycle, vertical, reversing and self-starting. Sliding gear speed change, all gears always in full engagement. Side entrance tonneau body, to seat seven passengers. Weight 2700 lbs., all on. Price $5000.00, including cape top, storm curtains, mats, horn, tools, and five lamps, ready for extended touring.

THE BODY.

The fuel tank, 20 gallons capacity, is placed under the driver's seat, and has a filling sleeve which pulls out to the front, exposing an opening in the tube top through which the tank is filled. A float rings a bell when the tank is full, also when the tank holds only one gallon of gasoline. A door in the rear of the car gives access to a large compartment under the rear seat, which contains tool drawers and has room besides for a spare tire. The rear seat takes three passengers, and two more are provided for by swinging seats on each side in front of the rear seat. A refrigerator for ice water is placed on the tonneau floor, close in rear of front seat.

THE AXLES.

A capped steel casting housing takes the bevel gear and the beveled balance gear, two pinions; the bevel balance gears have squared eyes, and take the squared inner ends of the rear axles, which have ball clutches to the rear wheel hubs. The front and rear wheels both are on Timkin bearings, rear bearings on the steel tube rear axle sleeves. The front axle is one piece, I-section, steel forging.

The springs are four half-elliptics in the rear, two on each side of each chassis side frame, giving ample drop. This "twin" or "duplex" rear spring is a new design, springs 52 in. long by 2 in. wide. The front springs are 46 in. long by 2 in. wide.

THE CHASSIS FRAME.

This is pressed steel, 5-32 thick. The frame has three pressed steel cross-girts, and has four deeply dropped intermediate cross-girts, which carry the motor and change gear, three Parsons bronze girts in rear and one steel forging girt in front. No struts are used. A torsion arm of steel tubing is fitted, stopped at its front end by top and bottom coiled springs, abutting against a cross-girt.

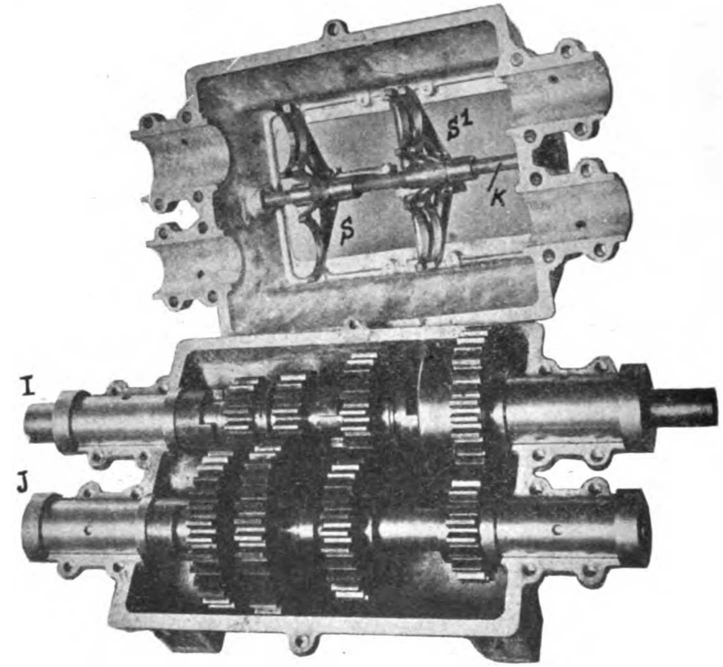


Fig. 6. Harrison Change Gear, box cover above, with gear shifters in place. This action has four pairs of gears and one reversing pinion, 9 pieces of gearing in all, coacting gears are always in full engagement. For shifting the gears are handled in two groups, one group of two pairs of gears and the other group one pair and a clutch. The two bronze gear shifters have independent movements lengthwise on the rod from the vertical H-slot lever. Thin flanges, one on each pair of gears, are brought together, so as to be embraced between the walls of the slotted shifters, S, S1, so that right or left movements of S or S1 move two elements right or left in the gear box. I, line shaft, J side shaft.

The brake-drums are drawn steel shells, 14 ins. dia., applied to the rear wheel hubs. Both exterior brake bands and the interior expanding shoes are faced with camel's hair felt; the brake rocker is carried in journals fixed to the rear axle, and all brakes are pedal applied, through eveners. See control illustration and caption.

The motor is self-starting and reversing. Self-starting is effected by cutting off the gasoline mixture and opening an air valve to fill the cylinders with pure air; the cylinders are piped on top to the acetylene gas tank.

TO FILL THE CYLINDERS WITH PURE AIR.

From the carburetor the vertical mixture pipe is led through the small globular water jacket, E, Figs. 2, 3 and 12, where the mixture pipe is surrounded by water from the radiator passing to the cylinder water jackets. Above E the mixture pipe branches right and left, and above these branch pipes a sliding sleeve air valve, D, is placed, which when moved one way is closed, so that mixture from the carburetor goes to the cylinders, but when D is moved the other way mixture is shut off from the side pipes and pure air is admitted to the cylinders through D and the side pipes.

When D is turned to shut off the mixture and admit pure air to the cylinders, the movement of D is made to switch the current off the commutator.

TO ADMIT ACETYLENE GAS TO THE CYLINDERS.

A square eyed lever is slipped on the acetylene tank valve spindle, and connects this lever to a pull up rod inside the car, accessible from the driver's seat, and places a bracket and temper screw over this valve arm, and adjusts the temper-screw so as to prevent lifting the valve-arm more than enough to make the lamps burn properly; this gives pressure enough to make a combustible charge in the cylinders filled with pure air, if the lamp cocks are closed and the tank valve is opened for a very short time. The acetylene gas is piped past the valve to the lamps, and also to the inside of a one way plug cock which has four ways in the cock-shell, one way piped to each of the motor cylinders. After the cylinders are full of pure air and the acetylene gas is turned on to the four-way cock, then the four-way cock plug is given one complete movement by hand, between two stops, and so gives a limited amount of acetylene gas to each cylinder.

It should be noted that the placing of the lever, movement regulated by a temper-screw, on the acetylene tank valve stem, avoids the necessity of adjusting the valve at each opening to make the lamps burn right. All that is needed to supply the lamps or to give the cylinders a stating charge, is that the driver shall pull the cock lever upward as far as the temper-screw will permit. The temper-screw needs adjustment only once or twice in emptying the full pressure of gas in the tank.

TO IGNITE THE STARTING CHARGE.

The air-sleeve, D, is opened by one movement of a hand lever on top of the steering wheel, this one lever movement first switching the current off from the commutator and next opening the air valve, D; the movement of D to open it to admit air to the cylinder supply pipes also closes the mixture pipe to the motor cylinders, so that when the motor is thus stopped all the cylinders contain pure air and one charge is under compression. The cylinders are then given each a charge of acetylene gas, as detailed previously, by a single movement of the 4-way cock plug, so that at this point everything is ready to fire the proper charge and start the motor.

The commutator is mounted on a horizontal shaft in the rear of the front board, driven from the cam-shaft through two pairs of miter gears and vertical shaft. The commutator has three circles of 4 contacts each, each contact circle separated, and all three circles in one cylindrical sleeve fiber outside casing, stationary, to which the wiring is led and fixed in the usual manner. Inside of this stationary outer contact carrying sleeve of fiber, is a second concentric sleeve of fibre which carries 12 brushes is revolvuble, and is linked to a butter-fly governer housed in the cylindrical casing at the left of the rear side of the front-board. (See Fig. 5, Harrison control.) The commutator projects to the rear of the governor housing, and is fully exposed and accessible. The brushes are each formed of a short brass tube, spun over at the ends to retain steel balls separated by a coiled spring tending to force the balls outward. The commutator shaft carries a sleeve on which 3-integral cams are formed, one cam to coact with the four starting brushes, and 2 cams, similar, 180 degrees apart, to co-act with the two circles of ball-brushes for the running ignition. The two circles of ball brushes and the duplex integral cams, set 180 degrees apart, perfectly balance the cam contact with the two circles of ball brushes which are controlled as to angular advance by the governor.

The starting commutator contact circle is next to the governor casing, and these contacts are not normally supplied with current, but are given the current at the instant of firing the starting charge by sliding four spring brass conductors over the four starting contact continuations which project through the fiber contact sleeve, as follows.

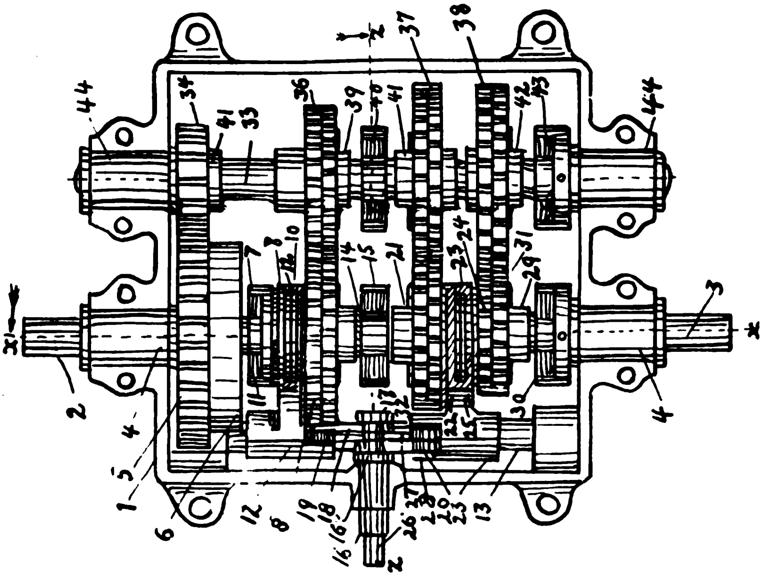


Fig. 7. Harrison change gear, plan with cover removed, staggered gears. 3, Line shaft. 2, Tail shaft. 33, Side shaft. 13, Round shifter guide.

There are two ratchet retained hand levers on top of the steering wheel, usual construction. One of these hand levers controls the throttle, the other hand lever controls the starting assemblage, and by its first swing, extreme to extreme, closes the mixture pipe from the carburetor to the cylinders, opens the cylinders to pure air as previously specified, and also moves the four spring brass electric conductors out of connection with the regular commutator contacts, forward, over and beyond the starting contacts, so that at the end of this first movement of the starting lever the cylinders are open to pure air only and neither the regular running commutator nor the starting commutator is supplied with current. This cuts off the spark and the mixture, fills the cylinder with pure air and compresses two of the four pure air charges equally; next all four cylinders are given acetylene gas by turning the 4-way gas-cock. Then the reverse movement of the starting lever on top of the wheel is made, which simultaneously closes the pure air communication with the cylinders and restores carburetor communication, and draws the four spring brass conductors first over the starting commutator contacts, which gives the firing spark to the proper cylinder without pause in the rearward travel of the spring brass conductors, which finally come to rest on the running commutator contacts when the hand lever reaches the end of the return travel. Thus the forward movement of the starting lever and the movement of the 4-way cock plug, followed by the return movement of the starting lever, reverse the motor. All three movements can be made with ease, very quickly, so that on the testing stand the motor can be so quickly reversed that the eye fixed on the flywheel does not see the flywheel arms at all, and the observer does not feel certain that the flywheel has reversed its direction of motion. It is not yet known that this rapid reverse is good practice, and the writer has not seen this motor running, but is telling what Mr. Menges says is true. Of course the motor can be brought to a full stop before firing the reversing charge.

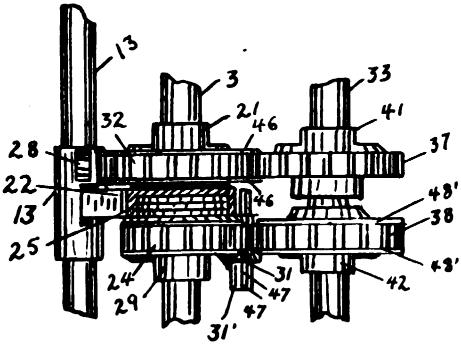


Fig. 8. Harrison Change Gear. Menges' shrouded gear engagement retention. 13, Round shifter guide. 46, 46, 47, 48, and 49, gear teeth shrouds by which the engagement of coacting pairs of gears is maintained while the coacting gear pair is moved axially by pressure applied to the gear hub of one gear only of the pair.

VARYING VALVE LIFT.

All the bell-crank lifters are on the right hand side of the cam-disks, Fig. 11, hence if the cam-shaft is moved bodily to the left the valve lift will be diminished. A ratchet retained hand lever is placed so as to give a finely graduated valve-lift reducing movement to the cam-shaft, less exhaust valve lift slowing the exhaust-cam time and reducing the volume of charge sucked into the cyinders through the automatic intake valves. Again, the exhaust valve time can be retarded by turning the reversing shaft, which also reduces the charge volume.

The cams fixed to the cam-shaft, and their coacting hand-adjusted cams have double toes, 180 deg. apart in two concentric circles, so that the push of the adjustable cam-disks to the right, Fig. 11, is balanced, same on each side of the cam-shaft. This makes the cam action smooth and durable, none of the cams showing any wear as yet.

The cams are placed and fixed at random on the cam-shaft, so far as angular advance time is concerned, and the valves are timed by moving the gears on the reversing shaft, held by set-screw through trial, and finally pinned to the starting shaft. This enables the adjuster to give each valve exactly the time he pleases.

STARTING SHAFT GEARS.

The gears which connect the starting shaft and the adjustable cam-disks do not have the same numbers of teeth. Mr. Menges could not give the tooth numbers, but they are nearly the same; this variation in tooth numbers must exist, to make the cylinders fire in pairs when the reversing shaft is turned the non-reversing way.

ADVANTAGES OF MENGES' VALVE ACTION.

. Menges says he does not intend to build reversing speed change gears, and will thoroughly test the motor reversing, which will give 3 forward speeds and 3 reverse speeds. With the reversing gear the Harrison car has 7 speeds, four forward and three reverse. The omission of the reverse pinion in the sliding gear is an advantage, of course, and the three reverse speeds is an advantage.

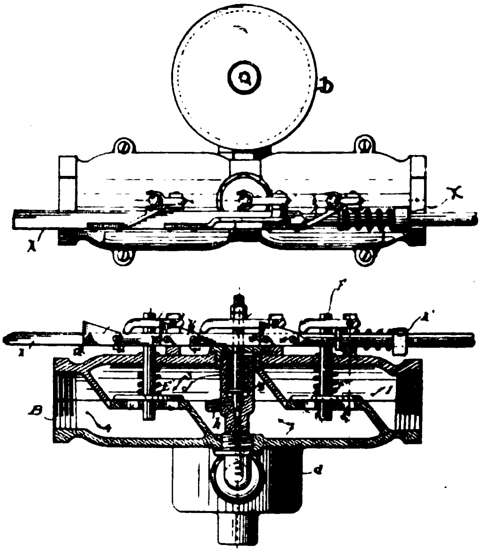


Fig. 9. Harrison Carburetor. Air enters at the right, passes under the valve carried on the stem I, passes around the needle valve sleeve and seating, and passes the carburizing nozzle, h, and then goes under the throttle valve carried by the steam, E, and out through B, to the motor supply pipe. In practice the springs over the air and throttle valves are omitted, and small passages are cut in the face of the air valve so that when the air valve is on its seat enough air can pass to run the motor. A wedge bar, X, carries three independently adjustable wedges, and by moving X to the right the three wedges are made to lift the throttle valve, needle valve and air valve, respectively, each more or less according to the varied angle of the wedges, which are set to suit the demands of the motor. The height of gasoline is regulated by a float in the chamber, d, covered by b. The wedge rod, x, is linked to a hand lever on top of the steering wheel, and is also connected to the clutch pedal, so that when the clutch is disengaged the throttle is closed.

The reversing shaft enabies the driver to retard or advance his valve action time at will, and the valve lift regulation by camshaft endwise movement permits the driver to modify his valve action so as to obtain very soft, still working.

Taken altogether Menges believes his valve action better than anything before offered, more durable, not more costly, and giving the driver a control of the motor not to be had with any usual valve action. No motor was running and no car was running during the writer's visit to the Harrison shops, and he consequently had no opportunity to make personal observations of the working of this remarkable reversing gas engine.

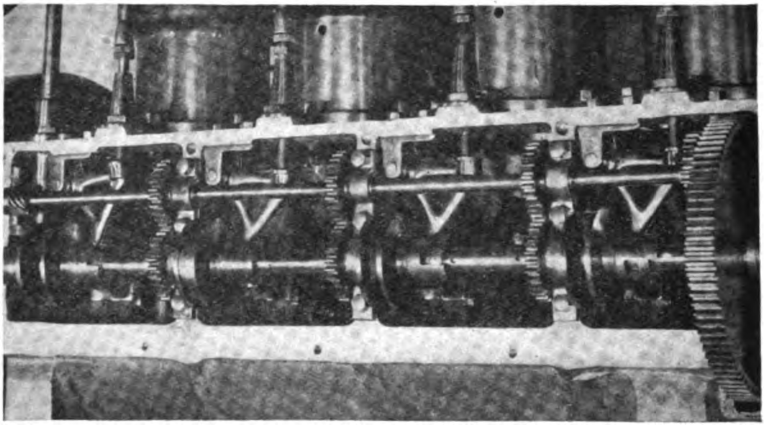


Fig. 10. Harrison Car. Menges' gas engine reversing action, side of crank box removed. The exhaust valves alone are mechanically operated, intake valves automatic. The cam shaft has fixed to it four disks, formed with integral side cams, and has revolubly mounted on it four disks formed with coacting face cams; the hubs of these loose side cam disks are splined to slide on and turn with the hubs of four gears, engaging four gears fixed to a hand rotated reversing shaft journaled above the crank shaft. The time of the first four side cams is fixed, but the coacting revolvuble cams can be rotated to any time of lengthwise movement on the cam shaft. Four bronze bell crank lifters have their lower downhanging ends in contact with the hand-adjusted cam-disks and lift the exhaust valves in times varied by the positions of the revolvuble cam disks. The hand-turned shaft is rotated from the driver's seat by a pair of 45 deg. angle spiral gears and the vertical shaft. Revolving the hand shaft one way reverses the motor; the other way cause the cylinders to fire in pairs, which is said by Menges to give much greater hill-climbing power than when the cylinders fire for each 180 deg. of crank shaft rotation. These side cams are said to work extremely well, and as the cam shaft is all by gearing, with notched quadrant retention, no springs, the timing is infallibly accurate.

The valves are nickel steel, heads and stems integral, ports 2⅛ dia. Extreme lift 7-16, ordinary lift ¼ to 5-16.

The piston packing is 4-flat lap snap rings, eccentric.

The piston pins are ⅞ dia., hard, ground and hollow, fixed in the top rod ends, and turning in bronze bushes forced into the pistons.

The rods are steel drop forgings, pins fixed by screw bodies cut into pins, lower ends of rods full marine type, wrist and crank shaft boxes split, Parsons white bronze.

The crank-box is an integral aluminum casting, not split, form showed by illustrations.

The muffler is an assemblage of aluminum sections, 5½ dia. x 5 ins. long, coned opening at centre.

CONTROL.

The control is not to be as shown in Fig. 5. There will be 3 large pedals, that on the right to engage the clutch, middle pedal to disengage clutch and apply exterior ordinary rear hub brakes, and that at the left to release clutch and apply emergency internal brakes.

Two plunger pedals are fitted, one for muffler cutout, applied to the first section of the muffler, and one to advance the spark beyond the governor placing, return to governor control of spark time when pedal is released.

The steering is by worm and worm gear sector. Two levers on top of the hand wheel control the throttle and effect the reverse. The needle valve does not have the wedge adjustment shown in Fig. 10, but is given a micrometer screw adjustment, independent of the wedge bar.

THE HARRISON-MENGES SLIDING GEAR.

Menges uses four pairs of gears with one long reversing pinion, and keeps all coacting gears always in full mesh with each other. See Fig. 8.

Two pairs of these engaged gears or one

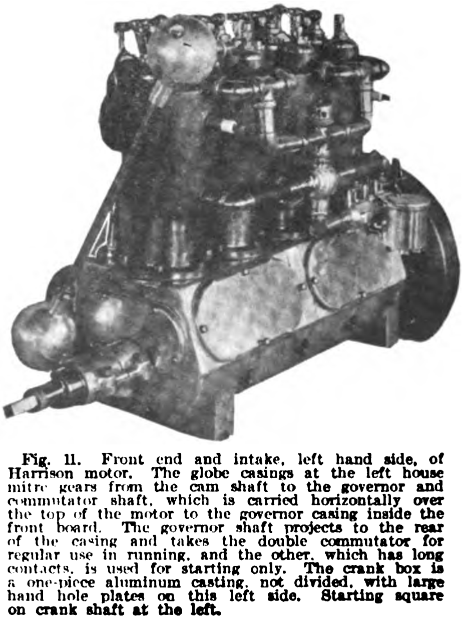


Fig. 11. Front end and intake, left hand side, of Harrison motor. The globe casings at the left house mitre gears from the cam shaft to the governor and commutator shaft, which is carried horizontally over the top of the motor to the governor casing inside the front board. The governor shaft projects to the rear of the casing and takes the double commutator for regular use in running, and the other, which has long contacts, is used for starting only. The crank box is a one-piece aluminum casting, not divided, with large hand hole plates on this left side. Starting square on crank shaft at the left.

pair of gears and a double clutch are always moved together. See Figs. 7, 8, 9 and 10.

To make two pairs of engaged gears move together by pushing the hub of only one of the four gears, the gear teeth must be held together sidewise. This may be done by (a) shrouding the teeth of one of the gears, see Fig. 9, or (b) by making each gear of two similar parts and fastening them together so the teeth will be staggered, which is Menges' preferred method.

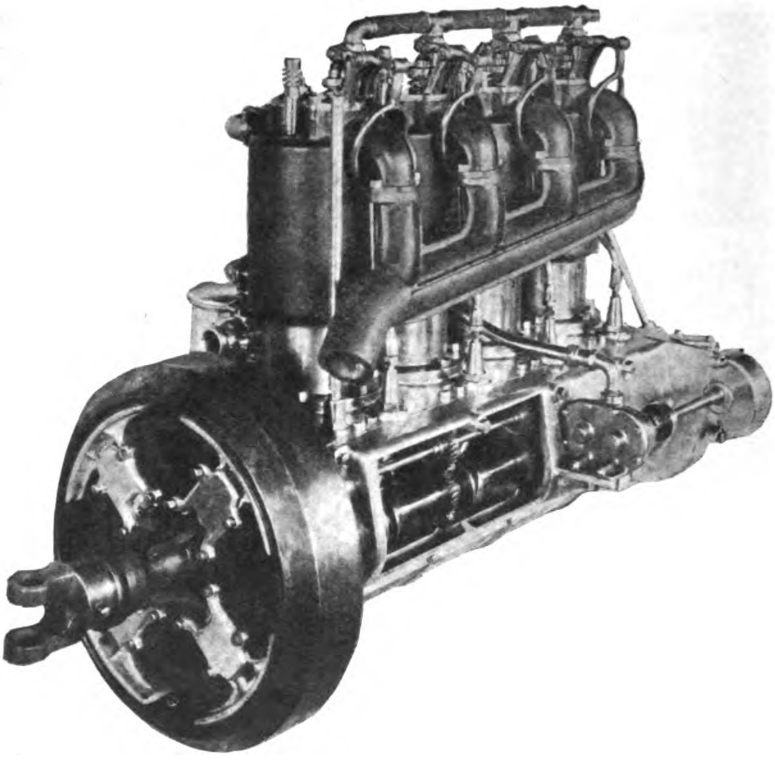


Fig. 12. Harrison Motor, clutch end and exhaust side. Automatic intake valves. Exhaust valves only are mechanically operated. The valves are worked with overhead beams. The top part of the exhaust pipe is integral with the cylinder. The push-rods are crooked, and are formed with large key-bow openings at the top, to take the top part of the exhaust pipes through the push-rods lines of action. The clutch cone is moved by an opened fork-lever, linked to a pedal. The cone works four levers, substantially parallel to the crank shaft axis, outward travel of spring-returned clutch-jaws adjusted by temper screws. See Fig. 13, clutch-jaw detail. Gear driven water pump at the right.

The two pairs of gears may be held in engagement and moved sidewise by bringing their thinly flanged adjacent hubs together and embracing the hub-flanges of both pairs of gears, 4 flanges in 2 pairs, in slots of one double ended shifter, as shown in Fig. 7, taken from the Harrison car as shown at the Coliseum.

The line shaft and side shaft clutches are the same in all the figures of the sliding gear shown, and Fig. 8 will be described as including the preferred gear construction.

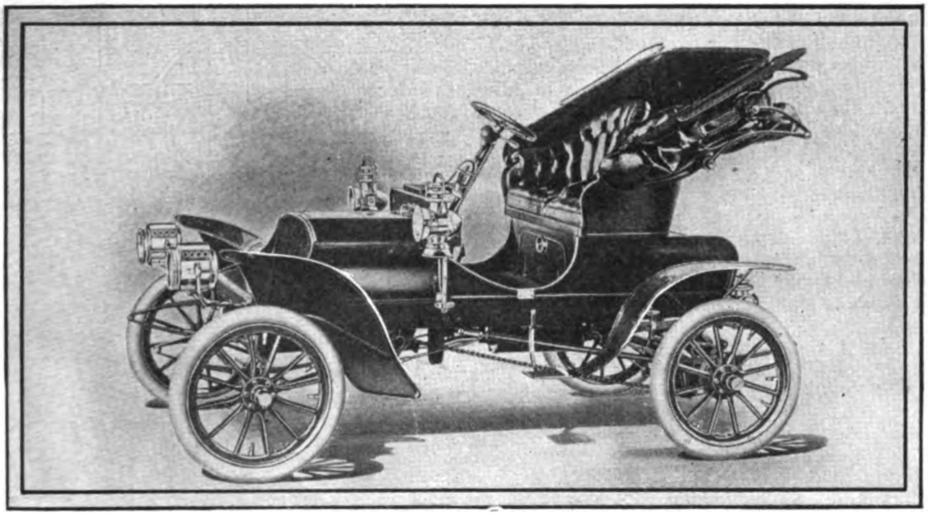
The line shaft, Fig. 8, marked 3, has two clutches fixed to it, marked 30 and 15. Gear 5 is always in mesh with pinion 34, and pinion 34 is fixed to the side shaft 33, while gear 5 is normally free of the line shaft, 3, and clutched to the tail shaft, 2. Gears 36, 37 and 38 are loose on the side shaft. Clutch members 40 and 43 are fixed to the side shaft, and are adapted to coact respectively with clutch members integral with gears 36, 37 and 38, clutch members marked 39, 41 and 42, respectively. Pinion 34, and clutches 40 and 43 are fixed to the side shaft.

Gear 5 and pinion 34 are always in mesh and have no sliding movement. The tail shaft, 2, has an integral clutch member normally engaging gear 5.

It is impossible to fully explain the construction of this sliding gear without a complete sectional drawing.

The operation is as follows: With the shaft 3 in motion, everything placed as in Fig. 8, nothing but the line shaft, 3, is driven. This line shaft, 3, ends at the lower line of 6. If shifter 12 is moved up, clutch 7 will engage a clutch member integral with the tail shaft member 2, high gear, and nothing else will be driven. If shifter 12 is moved down, the high speed is disengaged, gear 5 is automatically engaged with tail shaft 2, and nothing save the line shaft 3 is moving; continued movement of 12 downward engages the clutch members 14 and 15, and also clutch members 39 and 40, causing gear 8 to drive gear 36 and the side shaft 33, so that pinion 34 then drives the tail shaft 2 through gear 5, on the low speed. Before any shift of the second group of gears can be made, all the parts must stand in the neutral or idle posi-

FRANKLIN



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tion shown in Fig. 8. Then movement of shifter 23 upwards engages clutch members 21 and 15, and 40 and 41, so that gear 32 drives gear 37, side shaft 33, turning gear 5 by pinion 34, and driving the tail shaft, 2, on the intermediate speed. All parts being returned to the idle position shown, downward movement of 23 engages clutch members 29 and 30 and 42 and 43, and makes gear 24 drive 38 through the long reverse pinion, which is not shown, and so reverse the tail shaft, 2, through pinion 34 and gear 5.

When the speed change lever, Fig. 5, stands vertical the speed change parts are in idle position, the line shaft driving nothing. From this idle middle position the change lever may be moved directly to make any gear change, and cannot be moved wrongly, as to be moved at all the change lever must be returned to its mid-position, all idle, and is then ready to make either of its 4 engaging movements. When the change lever is in mid-position the clutch is always disengaged, automatically, and remains disengaged until re-engagement is effected by a separate pedal movement. It is thus made impossible to handle anything connected with the speed change improperly, as the gears are always in mesh, and the clutch is automatically disengaged by the act of bringing the lever to mid-position to change the gear.

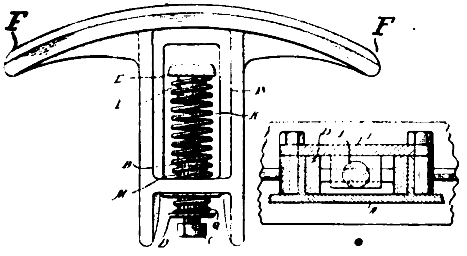


Fig. 13. Harrison Clutch jaw. One of four independent leather faced friction clutch jaws, moved radially outward for engagement by a lever, lifted against the adjusting screw, C, by a pedal operated sliding cone. The short stiff spring Q is an automatic leather wear adjustment. The long returning spring, K, has an abutment at E, integral with the jaw cap, and bears at its other end on the clutch body cross member, to hold the leather faced jaw out of engagement with the fly wheel rim.

ORIGINALITY.

The reader will look in vain for "standard practice" in the propulsion system of this Harrison car.

Menges places a short shaft with two universal joints between the clutch and gear box, and the propeller shaft has two universal joints. The axles show no startling features.

The valve action and the reversing of the motor car are believed to be wholly new, the carburetor is novel, and the sliding gear is an amazingly perfect construction, low in cost and ideally correct in action, and shows in a rather discomposing manner how easy it is for highly ingenious designerrs to take a hard way to obtain undesirable results, when an easy way would do what should be done. The reversing gas engine and the ideal sliding gear are two unexpected developments in motor car design, and Menges shows them both, and shows them of such quality as to command the closest attention and highest respect.

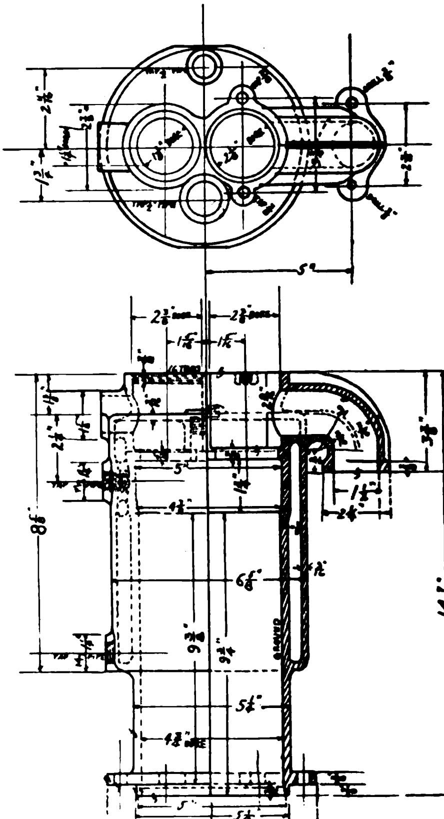


Fig. 14. Harrison Cylinder. Both valves, cages and holding sleeves or capnuts are the same. Automatic intake valves.

In the recent Los Angeles-San Diego endurance run, a Maxwell touring car, Model "H," received a special medal for exceptional excellence. This car traveled 172 miles on 13 gallons of gasoline and 1½ pints of oil, carrying four passengers. Its score for reliability at the end of the tour was 1000 points; it was then penalized 1 point for carrying a sign, which was contrary to the rules of the contest.

Figuring gasoline at the market price of 20c. a gallon and oil at 60c. a gallon, it cost just $2.71 for the entire trip, or 67¾c. per passenger for 172 miles, less than four-tenths of a cents per passenger per mile. The same infraction of the rules carrying a sign cost a Maxwell runabout, a standard Model "L," also entered, a gold medal after it had made a perfect score. The cost per passenger per mile for this car was $.0051, or little over a half a cent per mile.

The Winton Motor Carriage Company has purchased the Hi-land garage at Baum and Beatty streets, Pittsburg, in the centre of the automobile district, and will take exclusive possession of the property on April 15, when the Hi-land Automobile Company will remove to new quarters.

The "Silent" Knight Valveless 4-Cycle Motor Car

HUGH DOLNAR.

It is certainly an unusual proceeding in gas engine construction to link the cylinder to an eccentric and give the cylinder an independent travel of its own, but this is precisely what is done in the "Silent" Knight 4-cylinder, 4-cycle motor, which drives the "Silent Knight" 1906 touring car, built by Knight and Kilbourne, 19 Huron St., Chicago, Ill.

"Valveless," as used in the descriptive title adopted for this car, means that the motor has no puppet valves, two sliding sleeves taking the place of the ordinary gas-engine valves, the cylinder assemblage consisting of three concentric structures, the outer one flanged and water jacketed, and having ports at both top and bottom, but otherwise presenting much the apearance of the ordinary water-jacketed 4-cycle gas-engine cylinder. This outer member is bored, and has fitted to it a long thin sleeve, walls only 3-32 thick, of grey iron, finished inside and outside, and having lugs at its bottom end to take an ecentric driven rod which gives this outer sleeve a crank-time travel from the eccentric shaft, driven one turn to two turns of the motor crank-shaft, same as the ordinary 4-cycle motor cam-shaft.

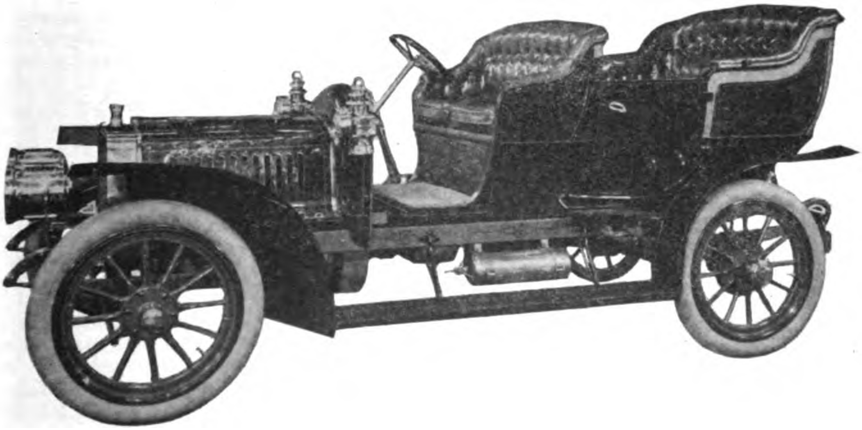


Fig. 1. Silent Knight 1906 7-Passenger Touring Car; wheel base 112 in., gauge 56 in., tires 34x4 in., any make; motor "Silent Knight," sleeve valves, eccentric driven, 4-cycle, water-cooled, 4 cylinders, 4½x 5½ in., 30 to 40 H. P.; body to seat 5 passengers on fixed seats and two on folding seats; side entrance tonneau; equipment, full set of tools, Rushmore lamps, Prest-o-lite gas tank, oil side and tail lamps and power driven tire pump; weight 2600 pounds; price $3500.

Inside of this first thin sleeve a second sleeve 3-16 thick, grey iron, finished inside and outside, it fitted to slide. This second sleeve is considerably longer than the first sleeve, and has lugs at its lower end to take a connecting rod from an eccentric mounted on the secondary shaft.

It may be said here that this secondary shaft has cam-shaft time, and is a true valve shaft, eccentrics taking the place of cams, and driving the outer sleeve and the inner sleeve constantly and positivly up and down; both the inner and outer sleeves have ports cut through them, top and bottom, and the cylinder also has ports, an intake and a "second" exhaust port at the top or firing end, and a "first" exhaust port at the bottom of the piston travel in the second sleeve, which is the virtual cylinder of the motor, and is 3-16 thick, which is enough to resist the firing pressure, the compression used being about 65 lbs. maximum. The piston diameter is 4½ ins., stroke 5½ ins.

The inner sleeve is 4½ ins. bore x 4⅞ ins. outside diameter, and the outer sleeve is 4⅞ bore x 5 1-16 outside diameter, while the outer, water-jacket shell is bored 5 1-16 diameter. The fundamental diameters as given are varied to give 2½ thousandths clearance on a side, total of 5 thousandths clearance between internal and external, same diameters, for clearance and lubrication, as the sleeves must move freely at all times in each other and in the jacketed cylinder. The shop names of the parts are the 'jacketed cylinder" for the outside supporting member, the "outer sleeve" for the sleeve valve and the "inner sleeve" for the working cylinder.

The eccentric shaft is driven one turn to two turns of the crank-shaft, the eccentrics are 17-32 throw, giving the two sleeves 17-16 travel up and down; and the outer sleeve driving eccentrics are 45 deg. behind the inner sleeve, or cylinder, driving eccentrics. The eccentric shaft and eccentrics are integral, turned up in the lathe on 8 centres for a 4-cylinder motor, these centres being 17-32 radius, and standing 45 deg. apart.

See illustration, cross-section of Knight's silent motor. The eccentric shaft position and the sleeves positions are those assumed when the piston is at high point, beginning of intake stroke. The second exhaust port is open until the piston reaches high point of its exhaust stroke, and the intake port begins to open when the exhaust port closes and the piston begins its intake stroke downward. The intake port remains open until the piston reaches the bottom of the intake stroke, when the intake port closes, and all ports remain closed until the charge is compressed and fired and the piston nears the end of its working stroke, when the first exhaust port, 1 in. long, at the bottom end of the piston head travel in the cylinder, is opened, and the first exhaust takes place, 2-cycle motor fashion, this first exhaust remaining open until closed by the piston in its upward exhaust stroke, also 2-cycle fashion.

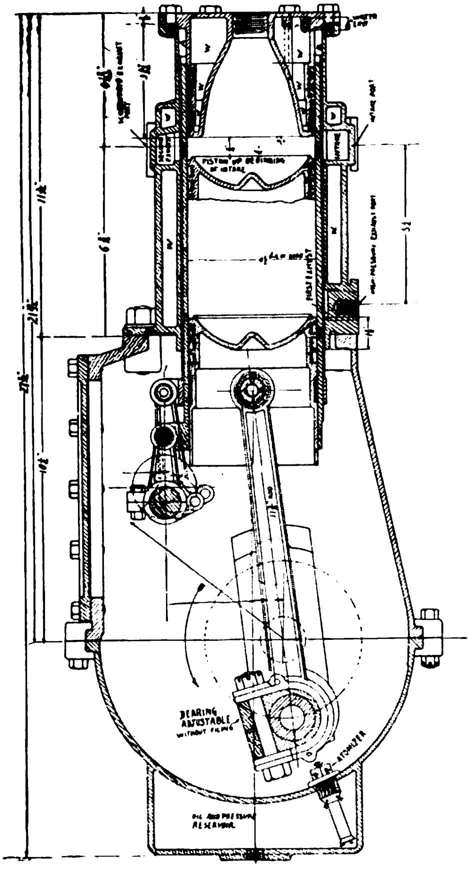

PISTON UP BEGINNING OF INTAKE
BEARING ADJUSTABLE WITHOUT FILING
ATOMIZER
OIL AND PRESSURE RESERVOIR

Fig. 2. Silent Knight, motor cross section. The peculiar features are the eccentric driven sliding cylinder and sleeve valve, the outer cylinder, sleeve valve and the working cylinder, also eccentric driven through a travel of 1 1-16 in., up and down. The sleeve valve and cylinder together make a valve action which has the sharp valve movements characteristic of the slide valve with a riding cut-off valve on its back, in steam engines, and the Atomizing Lubrication System, original with Knight.

The cylinder head is applied, and has external packing rings to fit the top of the cylinder, and also wide packing rings, in halves, with internal expanding rings, to cover the ports. The cylinder, valve and ports are all shown in the "piston up" position, at beginning of the intake stroke. The cylinders are offset one inch to the working side of the crank shaft. The wrist end of the rod is opened on the side, is split, and takes up without a liner, spring resistance only. A, A, air; W, W, water.

Thus the outer sleeve valve serves to close the exhaust ports through the intake and compression and working strokes of the piston down to the last half inch, the outer sleeve beginning to open the first, lower, exhaust port when the piston has made about 5 in. of its 5½-inch total length working stroke. This gives the first exhaust a long time of opening and almost wholly clears the cylinder of combustion products, leaving very little burned residue to be discharged through the upper exhaust port as the piston makes its exhaust travel upward. This upper exhaust port opens at about the same time the lower exhaust port closes, and the upper exhaust port closes when the piston reaches the top end of its exhaust stroke, and at the same time the intake port begins to open. The reader who is familiar with steam engine sliding valves will readily understand that the two traveling sleeves, one 45 deg. in advance of the other, ports cut in both sleeves, can give very sharp port openings and closings, same as the riding cut-off steam engine valve, while those familiar with the 2-cycle gas engine working will grasp the value of the first exhaust port of the Silent Knight motor, which takes the flame out of the cylinder at the earliest possible instant.

Thus Knight obtains two great working advantages, first by exhausting his cylinders sooner and more completely than is possible with the ordinary puppet valve arrangement, and secondly by substituting eccentric driven ported sleeves for cam actuated puppet valves closing on tight valve seats. Knight's valves and valve action make his port opening and closing time fixed and certain at all speeds, and the sleeve ports have lap enough to make them practically tight during the compression and working strokes. The cams and valves of the ordinary puppet valve controlled gas engine are its most delicate points, being cam actuated one way and spring actuated the other way, making it very difficult to obtain and maintain a rapid valve action that is noiseless, durable, and correctly timed at high speeds.

The head of the Knight cylinder is applied, and has a long down hanging sleeve with external packing rings to fit the bore of the inner sleeve or virtual cylinder. The head has 3 eccentric packing rings on top, and at its lower end, see cross section of motor, has a wide groove which takes a wide ring cut in halves, outside of a narrow inside spring ring, cut once, which packs the outer sleeve ports, preventing escape of vapor under pressure from the cylinder.

Since the Knight silent motor elements are all crank-driven, and have no impinging or valve-seating contact, it will work without noise at any speed if the rod and wrist joints are tight, and the writer could hear no noise of the motor at all during a demonstration ride on the Knight silent car.

This long sleeve cylinder head takes the spark plug at the top of a long conical compression chamber, and the intake is below the bottom of the head, so that the incoming cold charge must enter under whatever hot residue of combustion products may remain in the superimposed compression chamber at the time charge intake begins. The spark plug is at the top of the compression chamber.

All of these conditions would make ignition uncertain if much burned residue were contained in the compression chamber at the time the exhaust valve closes and the intake valve opens, as the contents of the combustion chamber at this time must form the upper portion of the compressed charge, the temperature variation forbidding the rise of any part of the cold incoming charge through the hot lighter residue above. But the ignition is not at all uncertain in this Knight silent motor. On the contrary this motor has a notable uniformity of exhaust cadence, showing uniformity of charge volume, compression and lighting, and thus conclusively proving that no appreciable portion of the burned charge lingers in the compression chamber at the time of intake beginning. This point is noticed at length, as the long compression chamber is unswept by any vapor current in exhausting, and at first sight of the motor section drawing seems likely to cause irregular firing.

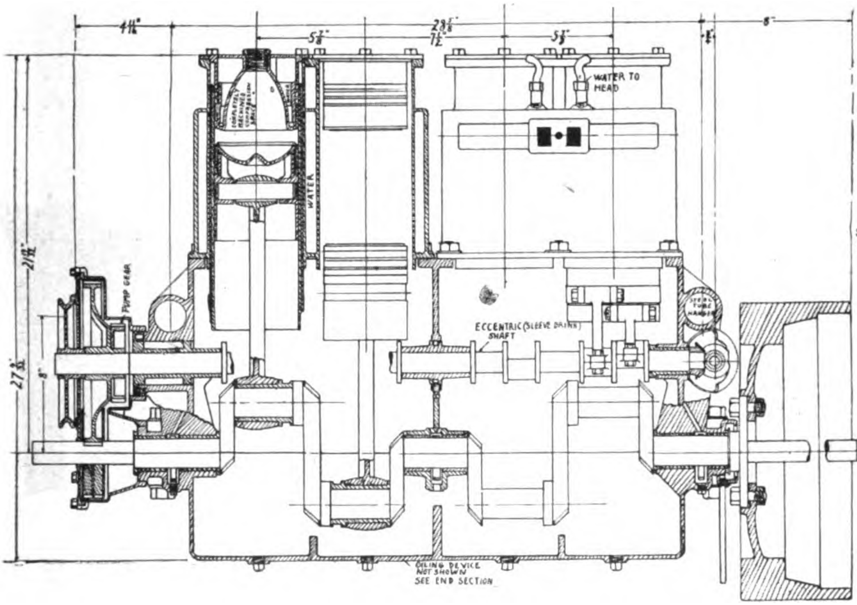

WATER TO HEAD
WATER
PUMP GEAR
ECCENTRIC (SLEEVE DRIVE) SHAFT
OILING DEVICE NOT SHOWN SEE END SECTION

Fig. 3. Silent Knight Motor Construction, mid vertical section.

ORIGINATION.

The silent Knight "valveless" 4-cycle motor represents six years of work by the inventor of the motor, three years in fully perfecting the motor design, followed by three years in the shop and on the road with the car.

The first four-cylinder silent Knight motor was perfected and installed in a Type VI. Searchmont touring car in 1904. The cylinders were 3½x4, and replaced a two-cylinder 4x4 motor. Where the original engine pulled the 2,300 pound car an average of from 10 to 11 miles on a gallon of gasoline, the silent Knight, without any particular effort at economy, averaged from 16 to 17 miles per gallon.

Early in 1905 the second four-cylinder model was completed. The cylinder dimensions in this model were 4x4¾. A shaft drive car was built for this motor, and owing to the fact that every part purchased over-ran its scheduled weight, the finished product weighed within a few pounds of 2,800. In the light of present practice this was overloading a comparatively small motor, but this same 4x4¾ engine pulled this overweight car at the rate of 35 miles per hour on the level with four passengers, at any time it was called upon to do so. Up to January 1 it had covered 8,154 miles in and around Chicago. It was fitted with a cyclometer the day it was put out, and a strict account kept of all gasoline used. The average has been a fraction over 15 miles shown on the cyclometer for every gallon of gasoline poured in the tank, including all idle running of the motor for exhibition purposes in the eight months.

Knight began work on this car with the intention of producing a gas engine as reliable and certain in action as the steam engine at high speeds. He fully understood the difficulties of obtaining a quick puppet valve action, cam one way and spring return, which could work properly at all speeds, and resolved to adopt the eccentric driven slide valve, which had never been successful in gas engine practice, because of the impossibility of lubrication. The sliding steam valve is lubricated without difficulty because of the low temperature, but sliding valves in gas engines had never given good results as to durability.

What Knight did was to take the quickest form of steam sliding valve, the "riding cut-off," and the form of steam valve which has least friction, the cylindrical sleeve, and give these valves such a large radiating surface in relation to the heating surface that they could easily be kept cool. Knight made his valves as large as they could possibly be, taking his working cylinder for his first valve element, and surrounding this with a second sleeve valve, these two valve members eccentric driven, and then fitting these two valve members to slide vertically inside a flanged and water jacketted vertical frame or supporting member, having the general form and appearance of the ordinary vertical gas engine 4-cycle cylinder without valve chambers. The enormous size and mass of these valves as compared with the heating surface of the port walls gave so great heat conducting and radiation capacities that Knight's sliding gas engine valves stay cool, and hold their lubrication perfectly, and the eccentric action obtains silence and certainty of correct valve event timing.

This second Knight car was on the road in May, 1905, and was placed in the hands of a gentleman not a car driver, and not an admirer of the motor car, who drove the "Silent Knight" with such freedom from all the common annoyances of the motor car that he became wholly convinced of the merits of the Knight motor, and has taken the financial end of placing the "Silent Knight" on the market.

Knight's inventions are patented in America and abroad, and those interested have the utmost confidence in the superiority of the "Silent Knight" motor over all other known forms of gas engines for motor car driving.

LUBRICATION.

Knight's two moving cylinders are long, thin, vertical, and have 1 1-16 in. travel on each other, can have abundant clearance, and have large vacant interior spaces open to lubrication and oil holes, and are never hot enough to burn oil, so that the oiling by well known methods presented no difficulties.

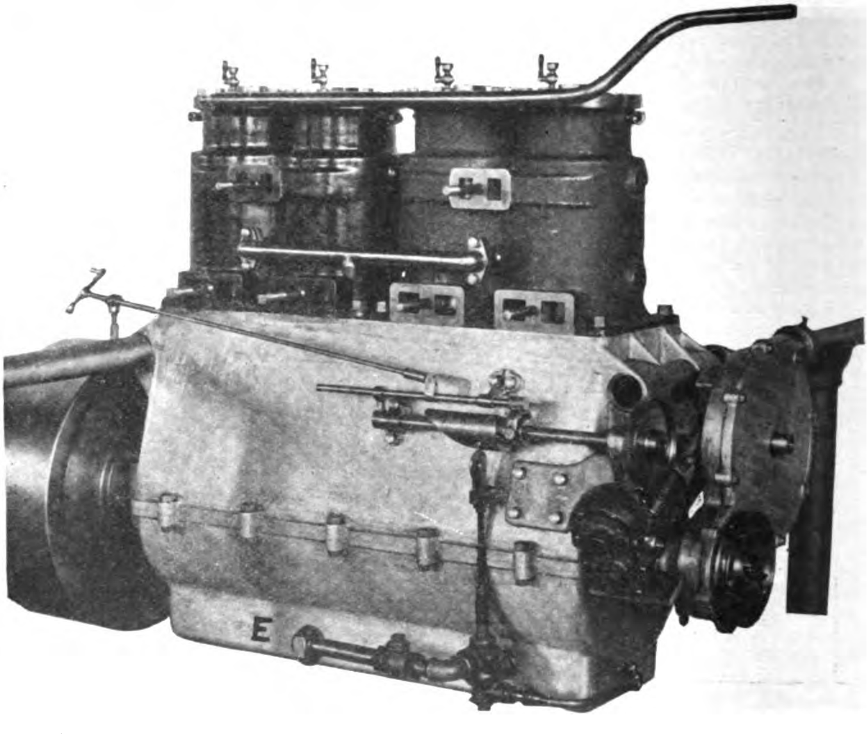


Fig. 4. Silent Knight Motor Oiling, E, pipe to exhaust. Exhaust pressure is admitted to oil reservoir while the valve is depressed by the spiral cam, which makes one turn to 100 turns of crank shaft. The cam is hand traversed on its splined shaft, to hold the exhaust valve open as much of the time as possible, and thereby work the oiling atomizers as much of the time as may be without causing a smoky exhaust. This illustration also shows the first exhaust at the bottom of the cylinders, and the second exhaust at the top of the cylinders.

Knight, however, elected to use atomizers, one for each cylinder, placed in the bottom of the crank box, and in the top of a closed oil and pressure tank, and admit an atomizing pressure from the motor exhaust. The atomizers, see vertical cross section of the motor, point upward toward the inside of the cylinder, oil enough is placed in the oil tank to stand below the pressure holes in the atomizers, and a drainage pipe from the crank box bottom leads back to the pressure admission valve, variable cam-time opened, which leads from the motor exhaust to the oil reservoir. The cam is hand adjusted lengthwise on its splined shaft, and is driven one turn to 100 of the crank shaft by a spiral gear reduction. See illustration. The pressure valve is spring closed and cam opened, opening time while the valve is held down by the cam, and closed time while the spring holds the valve up. The writer does not know the exact construction of the oil return elements from the crank box back to the oil reservoir; the pressure valve may act as a pump plunger also, to return the oil, or may be ported to make a gravity oil by-pass from the crank box to the reservoir. The atomizing time may be anything within the cam range, and the atomizing cycle covers 100 revolutions of the crank shaft.

The atomizers are kept at work as much of the time as can be without making a smoky exhaust.

This is believed to be a wholly new method

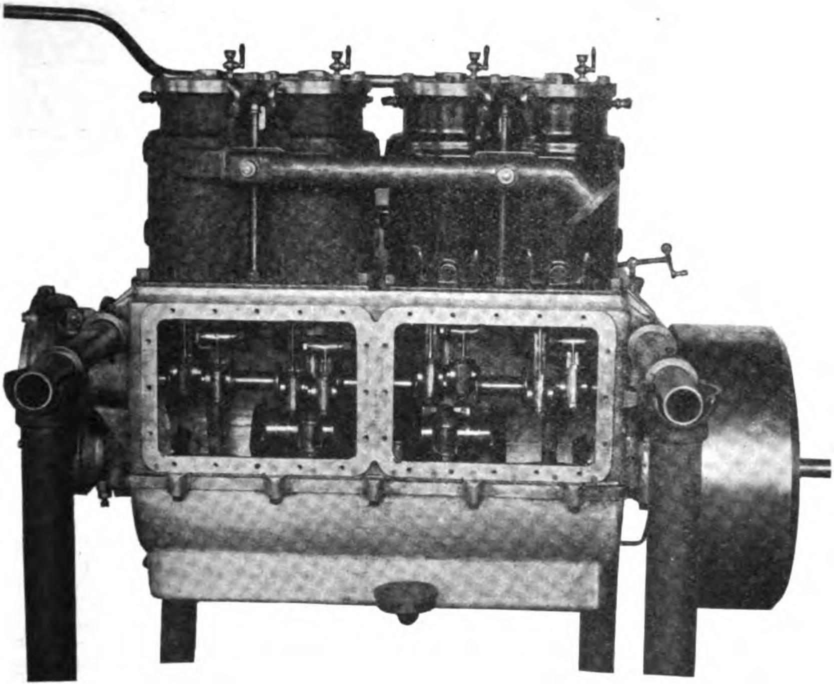


Fig. 5. Silent Knight, intake side of motor, base hand plates removed, showing eccentric shaft.

of lubrication, and is highly effective, uses little oil, and as the motor is entirely enclosed the oil keeps clean.

MOTOR SUPPORT.

This is by steel tube cross members, seated in brackets fixed to the chassis frame sides.

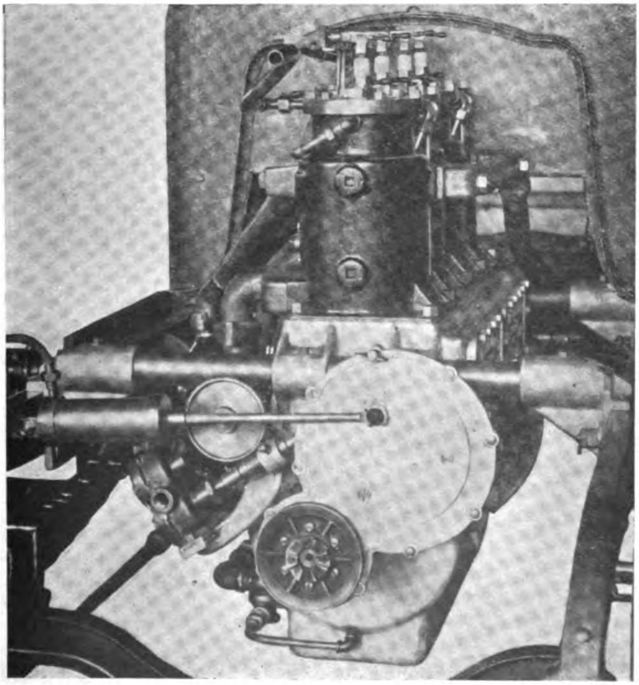


Fig. 6. Front end of Silent Knight motor. The tire pump, oscillating cylinder, is driven from a crank wrist in a disk fixed to the cam shaft. When not in use the pump rod gab-end is removed from the wrist and placed on the stud above. This picture shows the fan-shive, and starting ratchet, the water pump, and the oiler cam worm gear and driving worm, as well as the first and second exhaust pipes of the motor, and the motor frame supports.

and takes by finished seats in the top member of the aluminum crank box.

WATER PUMP.

This is two pinions, set crosswise, bevel gear driven from the cam shaft by a shaft which carries the atomizer cam shaft driving worm.

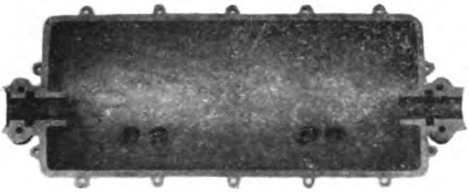


Fig. 7. Silent Knight Top of Oil Basin, showing atomizer nipples, aluminum casting, bolted up to the motor frame, and integral with the oil and pressure reservoir.

CHASSIS DETAILS.

These are principally by Garford, and are too well known to require detailed specification. This applies to the steering gear, chassis frame and front and rear axles, and the spark and throttle control. The emergency brakes are two rear hub drums, bronze hinged expanding shoes, fitted metal to metal, and one ordinary pedal applied brake is placed on the line shaft. The clutch is a 12½ deg. angle leather faced cone, with 10 coiled gradual engagement springs, see illustration. The springs are 50 in. long in rear and 42 in. front, rear end of rear springs shackled to interposed coiled springs.

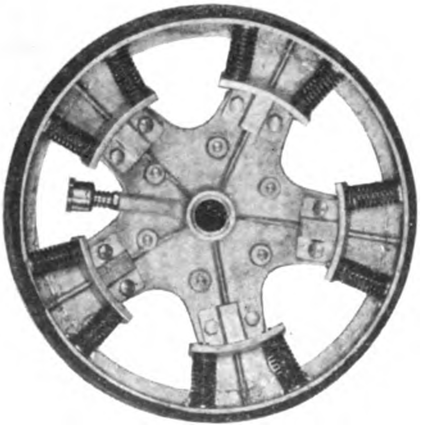


Fig. 8. Silent Knight cone clutch, showing 10-gradual engagement coiled spring construction.

MUFFLER.

Two mufflers are fitted, the first, which takes the first exhaust from the bottom of the cylinders, is twice as long as the second one, to which the first one is connected by a short pipe with a T, the second, top exhaust being piped to this T in the muffler connecting pipe. This muffler is perfectly silent. The first exhaust almost wholly clears the cylinder, and greatly reduces the cooling effect demanded by the cylinders.

The value of the primary exhaust at the end of the working stroke of the 4-cycle motor has been questioned, but it was shown in more than one instance at Chicago, and Knight is most emphatic in its favor, as heating the cylinder far less than exhausting at the top only, which means that the hot charge residue remains much longer in contact with the cylinder valves.

THE DRIVE.

This is by a short universal joint shaft from the cone clutch, Garford sliding gear speed change, three forward speeds and a reverse, to the propeller shaft, which has two universal joints and drives the bevel gear pinion. All the wheels are on ball bearings. The motor is carried on steel tubes set crosswise in supports on top of the chassis frame sides.

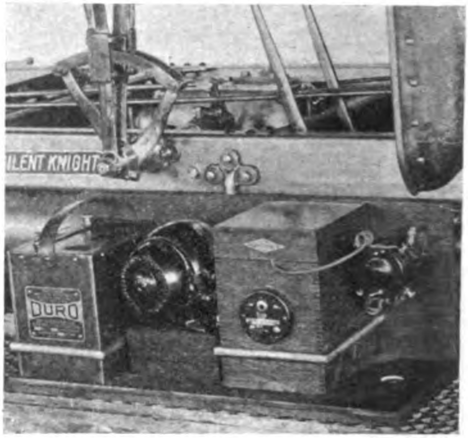


Fig. 9. Silent Knight electrical assemblage, Apple dynamo, coil box, commutator and storage battery, all cased in and carried on the right hand run-board, fully accessible by removing the box cover and side.

TIRE PUMP.

Knight fits an oscillating air pump, gab-end piston rod, which is carried on a valve motion gear casing stud when idle, and is connected to a disk on the front end of the valve shaft when the air pump is to be driven to fill the tires. This is a great convenience, and will probably be widely adopted.

CONTROL.

This is had by spark and throttle levers on top of the steering wheel, two large pedals, a muffler cut-out pedal, and two outside levers, the outer lever, ratchet retained, first disengages the cone clutch and then applies the rear hub emergency brakes. The inside lever shifts the gear. One pedal applies the ordinary brake to the transmission drum, and the other is used for clutch disengagement only.

The spark plugs are fitted with knife switches.

The whole electric assemblage, dynamo, storage battery, coil box and commutator, are placed inside a casing standing on the right hand run-board, extremely ready access, and convenient inspection.

Knight has studied the motor car with unwearied patience, has brought calm and unprejudiced judgment to bear on the facts observed in a long course of motor driving, and has satisfied his conclusions with original and cleverly designed mechanical effects, wholly unhampered by tradition or conventions of European practice. At first sight, it seems as if boldness outran discretion in making a valve of the working cylinder and yoking that hitherto invariably stationary element of the gas engine to an eccentric, but a detailed examination failed to reveal any disadvantage whatever, constructive, mechanical, or functional, imposed by Knight's bold renunciation of the puppet valve and its distressful cam shaft and its uncertain spring closure.

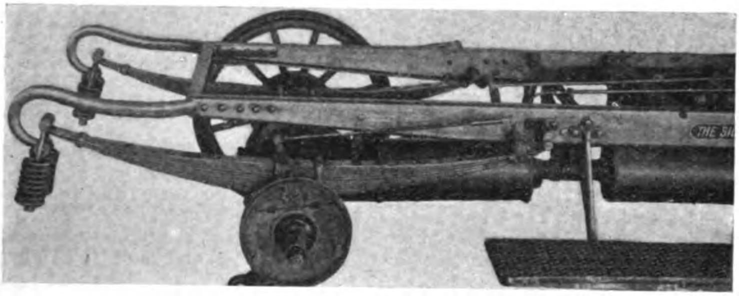


Fig. 10. Rear of Silent Knight Chassis, showing the rear springs and interposed coiled springs, and the double mufflers, long muffler takes the first exhaust, and is connected to the second muffler by a short pipe having a T, which takes the second exhaust. The valve of the primary exhaust at the lower end of the piston stroke is fully appreciated by Knight and some other gas engine makers.

Knight grinds his round work all true on the Brown & Sharpe cylinder grinder, and his atomizing lubrication system keeps everything well oiled. The Knight motor is really silent, and it is powerful for its dimensions, and the motor and fly wheel weigh only about 380 pounds with the fly wheel.

As to first cost, there is probably little to choose between Knight's valves and valve action and a well made cam shaft and valve action and valves for a motor of the same size, while the durability side of the matter is all in favor of the eccentrics and sleeve valves.

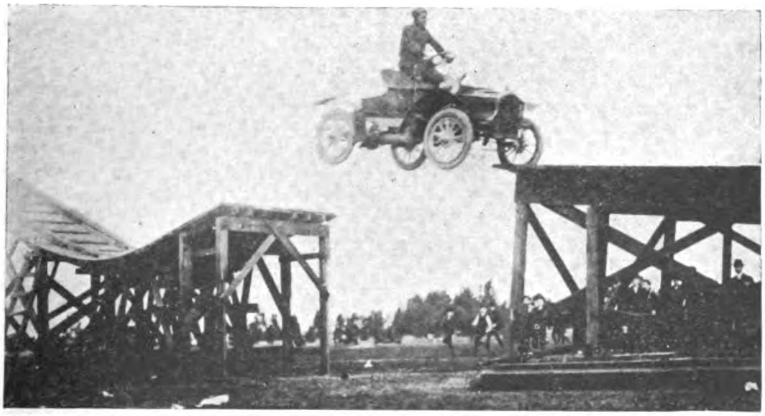
ON THE ROAD.

The writer had only a few miles run on level Chicago streets in the "Silent Knight." The car was really silent, was extremely prompt, showing perfect control and abundant power when called upon, and behaved admirably in every particular.

If any valves are to be retained in gas engines driving motor cars, Knight's highly original conceptions seem likely to meet great favor.

In charge of four men and in relays of 38 miles each a Rambler $1200 car, equipped with an 18 H. P. double opposed motor, recently made a non-stop run of 1383 miles in 98 hours and 6 minutes. The car started from the Rambler Philadelphia branch, 242 North Broad street, at noon, Tuesday, February 20, and run principally through the hilly section around Ogontz. The car ploughed through mud and water in one of the worst rainstorms of the year and sank to the hubs in the mud at some places.

At a meeting of the stockholders of the Salisbury Wheel and Manufacturing Co., Jamestown, N. Y., held February 20, it was voted to increase the capital stock from $50,000 to $100,000. A large addition will be built the coming spring, more machinery added, etc. Their factory has been running twenty-two hours per day for the past four months and will be obliged to continue at this rate until, at least, the first of July to complete the orders now on hand.



CADILLAO CAR JUMPING THE GAP.

Dr. Carver, a showman, has been thrilling spectators at Agriculture Park, Los Angeles, Cal., by a "jumping the gap feat" in a motor car. His colored driver, who handles the car as it jumps the 30 ft. gap, used a 1905 Model E Cadillac made by Cadilla Motor Car Co., Detroit, Mich., and it successfully withstood the strain, though it was a second-hand machine when purchased and had had six months' hard usage on the road. He made twenty leaps before leaving Los Angelis.

The Reliance Models C and D 1906 5-Passenger Touring Cars

HUGH DOLNAR.

The Reliance Motor Car Company, Detroit, Michigan, U. S. A., offers for the season of 1906 a line of trucks and delivery wagons, driven by 2-cycle motors, which are described in the Commercial Motor Car Department of this issue of the Journal, and two models, C and D, of 5-passenger cars. The only difference in these models C and D is in the bodies, C having a detachable tonneau, and D a built-in tonneau, these bodies being placed on the same chassis.

NOTABLE FEATURES.

This same size and about the same weight car was first supplied by the Reliance Company driven by an opposed pair of cylinders 4¾x5 inches. This motor drove the car strongly, but was changed in anticipation of the 1906 demand for high power to the pair of 5¼x5 inch opposed cylinders, in October, 1905, giving about a third more than what was regarded as ample power at the beginning of 1905.

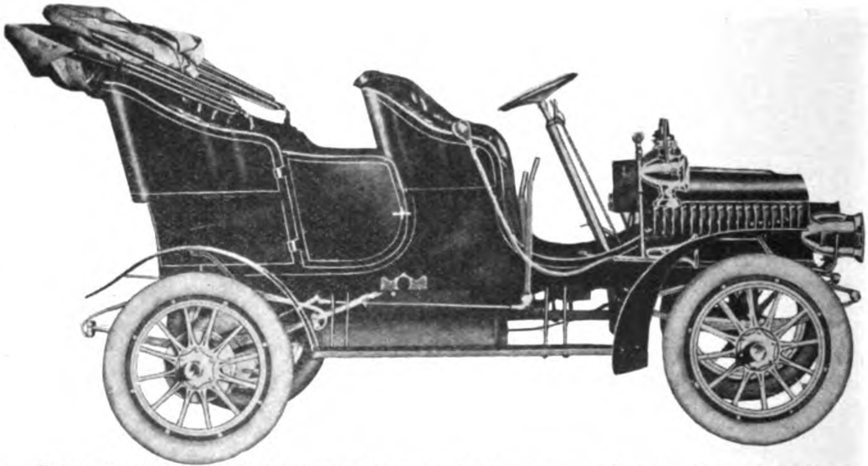


Fig. 1. Reliance Model D 1906 Touring Car; seats for 5 passengers; wheel base 92 in., gauge 56 in., tires 30x3½ in., motor an opposed pair of 5¼x5½ in. 4-cycle, water-cooled cylinders. Sliding gear speed change, two forward speeds and a reverse; chain to divided rear axle; weight 2065 pounds actual; price $1250, includes mats, horn, tools, and three oil lamps. The motor is guaranteed to show 22 B. H. P. Model C, same car with detachable tonneau.

Model D, built in tonneau; otherwise the two models are identical. Prices same for either model. The folding top is an extra fitted in various styles at from $40 to $150 additional cost.

The sliding gear, two speeds forward and reverse, the reverse pinion swinging into mesh, is very simple and strong, all gears hardened, and has given entire satisfaction for two years. The gearing is all 6 d. p., 1⅛ and 1¼ inches, face. The swinging reverse gear makes a short gear box, and throws into mesh with no clashing; this form of reversing pinion is used on some of the highest priced cars, and has never given the slightest trouble.

The chassis frame is channel steel, of abundant strength; the springs are all full elliptics, scroll heads in rear, 36 inches long, and plain elliptics 34 inches long in front.

The motor sets on top of the chassis frame cross-girts, and is built in the best manner throughout, having the crank shaft boxes adjustable.

The lubrication is by individual oil leads from a crank-box pressure oil tank, 6 leads to the motor and one lead to the change gear box.

The crank shaft is fitted with ring-oilers, and is carried in babbitted boxes.

The valves have cast iron heads, are all interchangeable, and cover 2 inch ports. The cam-shaft and gears run in an oil-pool in the bottom of the crank-case.

The water circulation is by a geared 3-pinion circulating pump, serving each cylinder independently, thus assuring equal cylinder cooling.

The hub of the commutator, which has ball-brushes, is mounted on a stationary sleeve, and is driven from the middle pump-pinion shaft.

The water tank and gasoline tank are placed under the hood in front, total water carried in radiator, pipes and tank is 4½ gallons. The gasoline tank capacity is 10½ gallons.

The brakes are internal drums integral with the wheel hubs, are 12 inches diameter, fitted with an expanding one-piece fiber faced shoe, hung at the top, cam-rocker expanded.

CONTROL.

The steering is 1½ turns of the hand wheel to full sweep of the front wheels, worm and worm gear sector, internal worm integral with bronze worm gear sector casing, sector hardened. The throttle and spark time are regulated by two bell-cranks in front of the steering post, under the hand wheel. The throttle opening can be varied also by a small pedal accelerator on the foot board.

There are two outside hand levers and two large pedals. The outside hand lever changes the gear, and the inside lever gives the reverse, of the two large pedals that on the left first releases the clutch and then applies the rear hub brakes. The right hand pedal first disengages the clutch and then unlocks the gear shift, and the clutch cannot be engaged until same gear change is in full engagement.

The front board is of wood, and carries the coil box on its rear side.

The clutch is an aluminum cone, 14 deg. angle, faced with leather, grain side out, flywheel capped and clutch engagement movement towards the change gear, to avoid spring thrust.

This car has a roomy body, and the finish and upholstering are of the best materials and workmanship. The full elliptic springs give easy riding, and the ample power avoids the necessity of frequent changes of gear. The sliding gear is of abundant strength and runs with little friction. The car, while not extremely heavy, has weight enough to give substantial construction throughout, and there are very few cars offered of equal appearance, quality and power for anything like the very moderate price placed on the Reliance 1906 5-passenger touring cars.

The burner is a one-piece casting, entirely enclosed, and is controlled automatically by a heavy diaphragm, maintaining the steam pressure at any desired point.

PRESSURE FED FUEL.

The gasoline is carried in a steel tank at the extreme rear of the car, having a capacity of twenty-five gallons. An indicator placed in the top of the tank shows amount of fuel at all times. The fuel is forced to the burner by air pressure. A water-jacketed air compressor connected to the engine automatically maintains a fuel pressure at all times of from 90 to 100 pounds.

An auxiliary air tank allows of filling with gasoline, and firing up without the use of any pumping by hand, and permits the car to stand two or three days with steam up and ready for immediate use.

The Ross Steam Car

The Ross Steam Car is made by Louis S. Ross Car Co., of Newtonville, Mass., and is driven by a 25 H. P., 2-cylinder, 4x5 steam engine. Hess-Bright ball bearings are furnished on the main bearings, cross heads and connecting rods. The valve gear is the Stephenson link motion, and controlled by four ball bearing eccentrics.

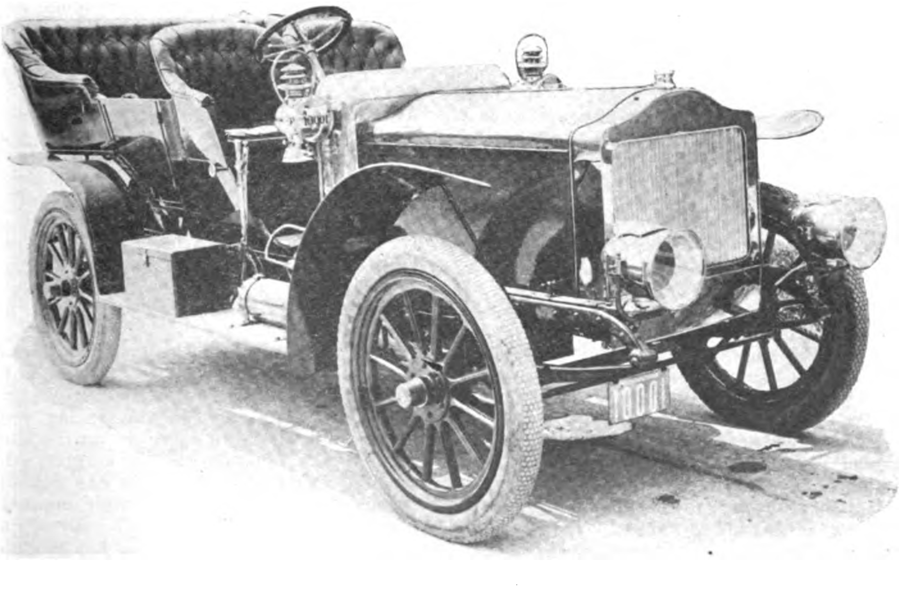
A water pump of ample capacity and variable stroke is actuated by a spur gear from main shaft. This pump is of a large diameter, and slow speed. The connecting rod and gears to the pump all run on Hess-Bright ball bearings.

Cylinder lubrication is provided for by a positive acting plunger pump with a variable stroke, and running at the same speed as the water pump, which is one-half as fast as the engine.

ACETYLENE GAS AUXILIARY PILOT LIGHT.

The manner of firing up is a novel feature, as the hand torch or alcohol drip cups, so common to steam cars, are entirely dispensed with. A small Bunson burner is connected with the acetylene gas supply, and can be ignited instantly with a match, regardless of whether conditions or high winds, and in a few seconds the main fire will be ignited. A regular pilot light is also fitted, the gas jet being brought into use only in case the car has not been used for several days. The boiler is 24x14 in. A fusible plug insures against boiler explosion. This plug has a steel shell and is easily removable.

An auxiliary Marsh steam pump is provided for filling the boiler when the water becomes low or either pump is inoperative from any cause. The driver's seat is upon the right hand side, and the throttle control is placed on top of the wheel, and connected by rod inside of steering column. The engine re-



The Ross Steam Car; wheel base 108 in.; pressed steel frame; 34x4-inch tires; 2-cylinder, 25 H. P. 4x5 engine; one piece enclosed burner; 24-inch boiler; all machinery forward under bonnet, and protected by false radiator front; carries 5; weight 2600 pounds; price $2800.

verse is a lever at the side, and close to emergency brake lever. The body is of wood, finely upholstered, and has double side entrance.

SHIELD FOR MACHINERY.

A large false radiator front and heavy brass dasher of the full roll type add an attractive appearance, and combined with a hinged bonnet, accessible from either side, furnish a dustproof shield to the machinery. The dasher is beaten from a continuous piece of brass, and has no joints or brazed corners. It is lined on the driver's side with a laminated mahogany panel, richly finished in its natural color. The steam and air gauges are placed on this panel and also the water level indicator. All connections are made from the back, thus insuring strength and a neat finish.

BODY.

The front seat is divided and the rear comfortably seats three, besides allowing ample room for light baggage. The body is entirely independent of the chassis, and can be removed easily by taking out four bolts.

Mud guards and wide running boards are provided, with two tool boxes on opposite sides of same. A copper water tank of heavy gauge copper is placed on the chassis so as to come under the front seat. It has a capacity of forty gallons, and is divided into several compartments to insure rigidity and prevent slopping of water due to road vibrations.

The car is completely equipped with oil side lamps and large acetylene searchlights. A Presto-O-Lite gas tank is carried on the running board. A complete tool equipment is also furnished, and the body is ironed for a top, any desired style of which can be furnished.

RUNNING GEAR.

The frame is of pressed steel, strongly riveted and re-enforced, and narrowed in front to allow of turning in short radius. There are three pressed steel cross members, one at the rear and two at the middle of the frame, while in front a flanged steel plate furnishes a support to the boiler, and a forged steel pan is designed to carry the engine. Both the boiler and the engine beds are strongly riveted to the frame.

The wheel base is 108 inches, and the frame is supported in front by forty-two-inch springs, and at the rear by forty-eight-inch springs. These springs are semi-ellptic, two inches wide, eight leaf in front, nine leaf rear, and made from best English steel. The spring hangers are drop forged, and the rear springs are shackled free at each end. Thirty-four by four-inch wheels are used.

The entire front axle is a steel forging with heavy spindles and steering knuckles, and adjustable distance rod, placed in front of the axle. The rear axle is of the floating type, bevel gear drive, strongly braced and trussed to secure continued alignment. The torsion of braking and driving is taken up by a steel rod running parallel to the drive shaft, and securely attached to engine pan opposite forward universal joint.

NO STRAIN ON AXLE.

The entire weight of the car rests on the tubing, and no strain comes upon the rear axle except in turning the wheels. Both axle and differential can be removed from the car, and adjustment of bearings can be easily made at any time. Both front and rear axles are entirely supported on Timken roller bearings packed in grease, and encased in dustproof housings. The differential is of the spur gear type. The bevel gears have a wide face and heavy teeth.

The universal joints are two in number, one placed close to rear axle housing, the other where the engine joins the drive shaft. The forward universal joint has a large steel flange securely attached, and the footbrake applies power on this. Both universal joints are of ample size, hardened and ground and encased in dustproof housings, and packed with grease, insuring long service without additional lubrication or attention.

BRAKES.

The emergency brakes are of the internal expanding type with bronze faces expanded against steel, and operated by a lever beside the driver. They will control the car at all speeds and on sharp grades either forward or backward, and are applied directly to the rear wheels. The footbrake is operated on the drive shaft, and has renewable friction face, and also gives complete control of the car.

Both brakes are entirely free from grease or oil. The steering gear is of the irreversible type with worm and sector, and there are eccentric bronze bushings allowing for adjustment.

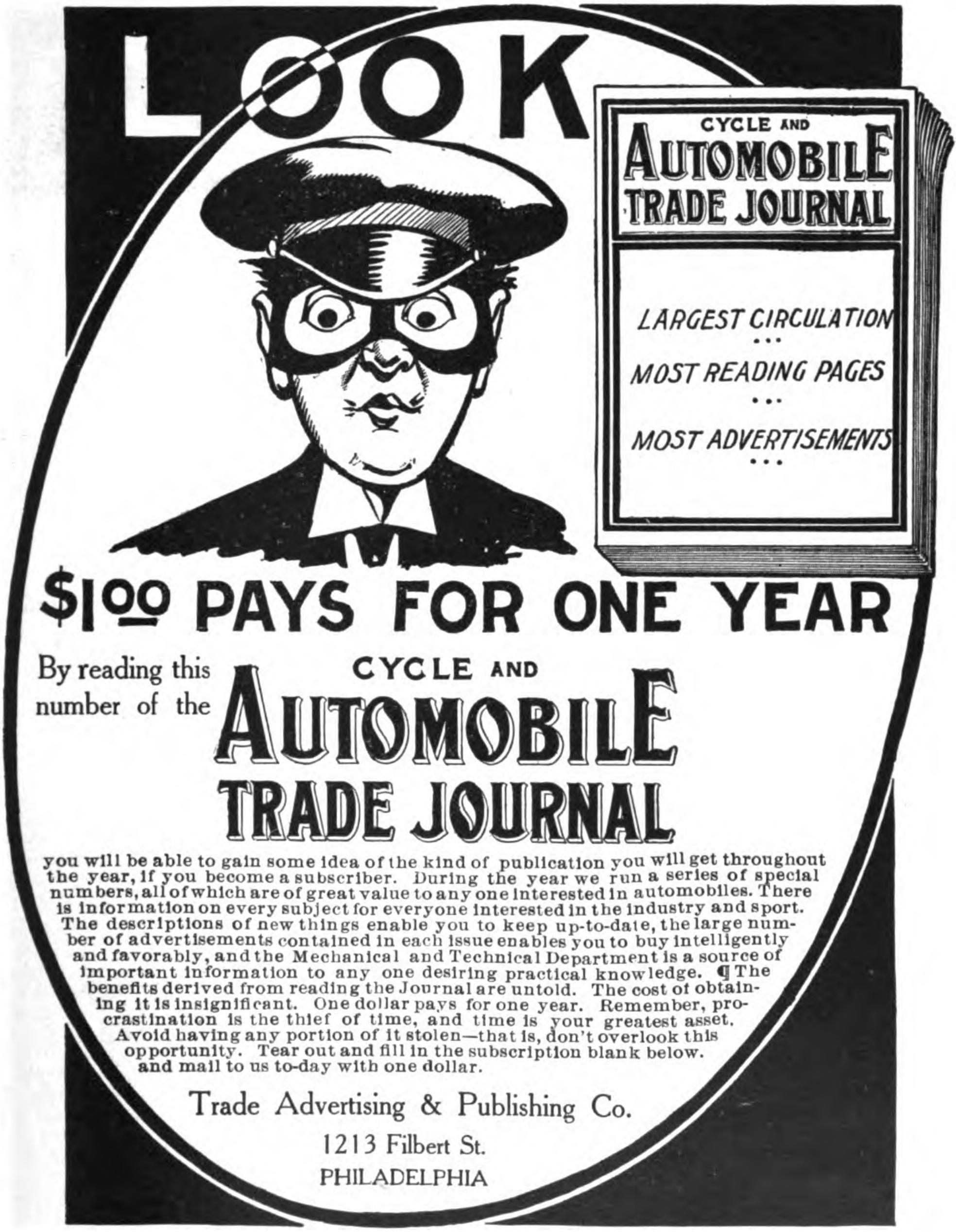
The "Success" Air-Cooled Car

The "Success" is an ordinary high wheeled runabout of the horse-drawn type fitted with motive power and suitable steering apparatus. The engine is air-cooled and is swung at the right side of the body midway between the two wheels. The bore and stroke are each 3 in. and three horse power is developed.

The steering apparatus is unique, but apparently practical and substantial. The common single piece buggy axle is arranged to receive the usual plain boxes of the common Sarven pattern wood wheels. This axle has, also, the usual carriage "fifth wheel," so that it may swing to the right or left. To the usual hill clips steering rods are secured, extending rearward from the axle, making an angle of about 45 degrees with the axle. To the rear ends of these rods are fastened the two ends of a ⅝-inch block chain which passes around a small pinion at the end of the steering column, the chain rods and axle forming a triangle with the pinion at its apex.

The steering column is turned by means of the usual hand wheel. A flat spring is secured to the frame of the machine by means of a bolt, one end of the spring bearing against the chain and preventing its jumping the pinion. This spring also acts as a brake to hold the steering wheel in any desired position, thus securng in a simple manner the feature of irreversibility. After many months' use this steering gear has proved satisfactory, and a patent has been applied for.

The wheels are 37 in. in front and 41 in. in the rear, or 40 in. front and 44 in. rear. Steel oval edge tires, ¾ or ⅞ inch wide, are fitted, being bolted between each pair of



LOOK

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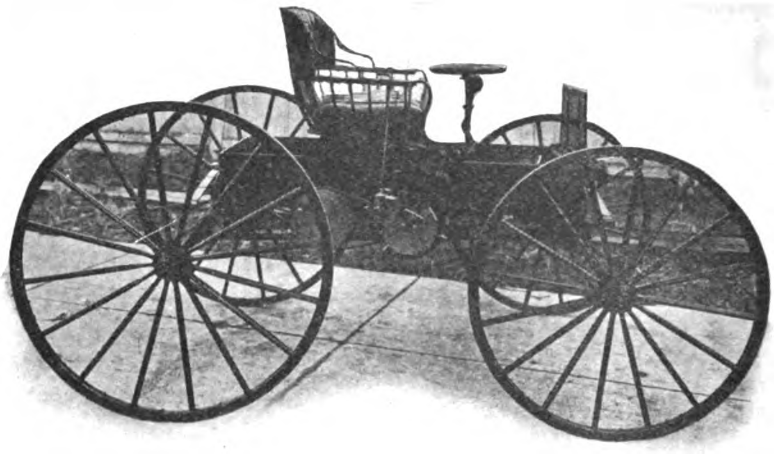


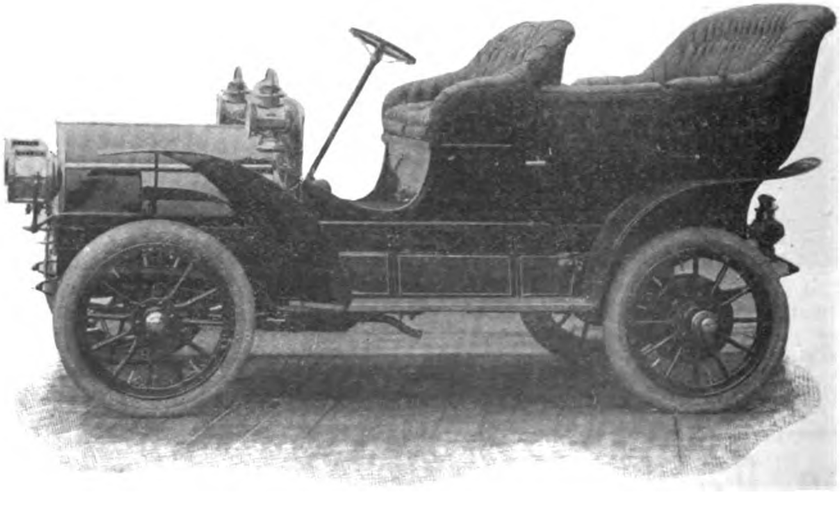
The "Success" Air-Cooled Car. Price $250.

spokes. The engine is jump spark ignited, dry cells furnishing the igniting current. The transmission is of the planetary type, giving two forward speeds and the reverse. Chain drive is employed. This car lists at $250. It is made by Success Motor Car Manufacturing Co., of 532 De Baliviere avenue, St. Louis, Mo.

In connection with the 100th anniversary celebration of Wilkes-Barre, Pa., May 10, 11, 12, it is planned to hold a hill-climbing contest up the Wilkes-Barre Mountain, a two-mile stretch of beautiful country road, with an excellent bed. Wilkes-Barre is only seven to ten hours' reasonable run from New York City, and all conditions are such as to promise a most successful event.

Standard R. B Co. Expanding

The Standard Roller Bearing Company, Forty-eighth street and Girard avenue, Philadelphia, Pa., have increased their capital from $2,000,000 to $3,500,000, and are erecting a four-story factory 150 feet by 200 feet for the manufacture of annular ball bearings. During the past year they have equipped with machinery a four-story building 95 by 200 feet and have built and equipped a two-story iron foundry, 70 by 150 feet, hardening and tempering building, 70 by 150 feet, and a crucible steel castings plant 160 by 100 feet. Including the employes of the new building the company will employ over 1000 hands for the manufacture of steel balls, ball bearings, roller bearings, automobile axles, and annular ball bearings.

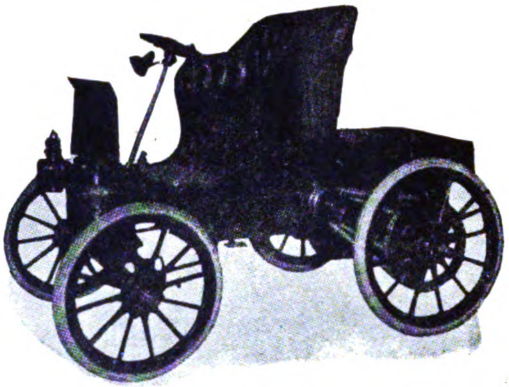


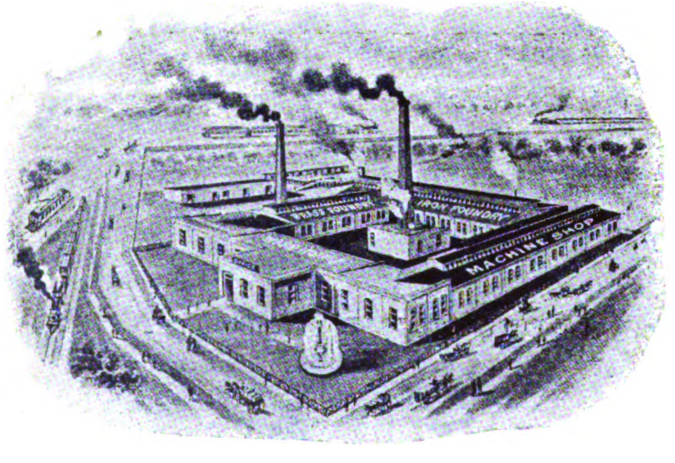
Marmon Model D 4-Cylinder, 32 H. P., air-cooled car; price $3000; 32x4 in. tires; weight 2400 pounds; same mechanism as Model C, described in our October, 1905, issue. Note particularly the elegant lines of the body in the rear. On page 244 of our last number a cut of another car appeared over this descriptive matter through error. We ask our readers to kindly note that the above is the correct illustration of the Model D Marmon.

Palmer $400

RUNABOUT

Order Now for May Delivery—Unprecedented Sales





A car with full seating capacity, single cylinder, double action, two cycle vertical, 9 H. P. engine, water cooled, cable transmission; four speeds, two forward, two reverse. Absolutely noiseless and a great hill climber.

$400 with 2 inch solid tires. With Swinehart or pneumatic tires, **$500**

AGENTS WANTED

The Palmer Automobile Mfg. Company

731 Schofield Bldg., Cleveland, Ohio

The Car Without One Weak Spot

Cleveland

Model F, 30-35 H.P.
5 to 35 miles per hour on third speed.
Guaranteed for one year

Consider the Cost of Maintenance

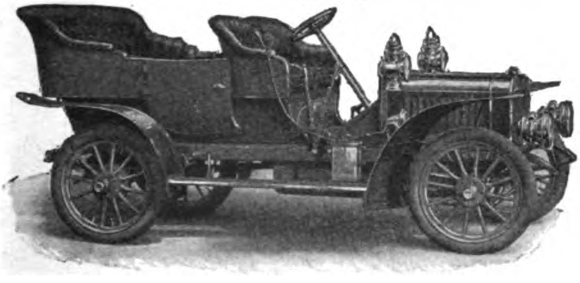
It isn't the first price of a car that should be considered.

A good car costs a good bit of money, because high-grade design, material and construction are expensive. But a **good** car is cheaper to maintain than a car that sells for a dollar less than a good car can be made for.

The **CLEVELAND** will run longer and do harder work at less repair cost than any American, or Foreign car, for that matter, because there's not a weak spot in its entire construction.

If you could run a 30-35 H. P. Car for ten thousand miles at the cost of a barrel of gasoline in repair bills, wouldn't it make **that car** worth while?

Dozens did it with our Model D last year. A full hundred ran an average of 5 thousand miles, at an average repair cost of $4.00.



Showing the Cleveland Model F, Equipped with the Tulip Body
Price, $3,500.00

What did your good car do? Take out your pencil and figure.

The **CLEVELAND** car is the **economy** car, because it's the **quality** car.

Imported Simms-Bosch low tension magneto with make and break spark is used—doing away with spark plugs, coils, wiring and batteries. Weighs 2400 lbs. equipped for road.

Specifications:

4-cylinder. 30-35 H. P.

Imported Simms-Bosch Magneto-automatic make and break spark.

Direct Drive, Nickel Steel I-beam front axle.

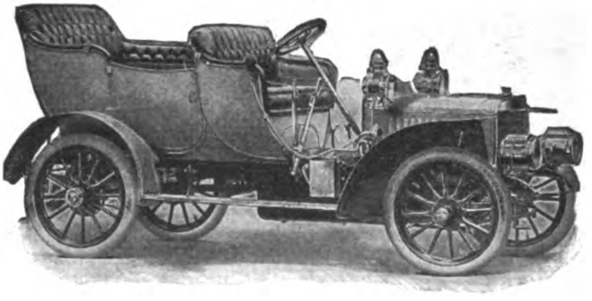
34 x 4-inch wheels, Ball Bearings.

Wheel base, 104 inches.

Simplest control, 5 to 55 miles on high gear.

Absolutely noiseless.

Body option, Victoria or Tulip as illustrated.



Showing the Cleveland Model F, equipped with the Victoria Body.
Price, $3,500.00

Price, $3,500.00 to $5,000.00, depending upon body equipment.

The 20-H. P. Model D will be continued without change. Price, $2,800. Both models guaranteed for one year. Catalogue and full information on request.

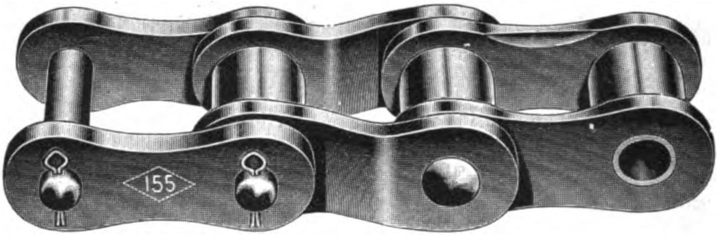
CLEVELAND MOTOR CAR CO., Dept. 2, Cleveland, Ohio

General Eastern Distributing Agent:
E. B. GALLAHER, 228-230 W. 58th Street, New York

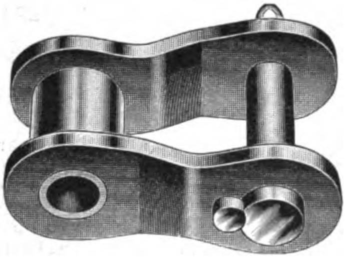
Boston: Butler Motor Car Co., 998 Boylston Street.
St. Louis: St. Louis Automobile and Livery Co., 3685 Olive Street.
Newark, N. J.: Burt & Company, 286 Halsey Street.
Chicago: The Cassaby Fairbanks M. Co., Michigan Avenue and 14th Street.
Philadelphia: Diamond Motor Car Co., 2117-20 North Broad Street.
So. California: A. P. Worthington, Los Angeles, Cal.
Buffalo: Cleveland Auto and Cycle Co., 649 Main Street.

"Diamond" Offset Repair Links

The Diamond Chain and Manufacturing Company, Indianapolis, Ind., with their usual foresight, have met promptly the growing demand for an offset link for roller chains, and are now prepared to furnish a complete line for each style and pitch of chain which they now produce.

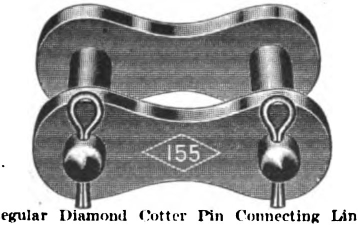


Combination Diamond Roller, Offset, and Connecting Link.



Offset Diamond Chain Link.

They are furnishing the regular cotter pin connecting link, an offset link and a combination roller, offset and connecting link, a set of which is convenient for the tool kit of each car, for making repairs and for changing the length of chain where one wishes to change the ratio of gears.



Regular Diamond Cotter Pin Connecting Link.

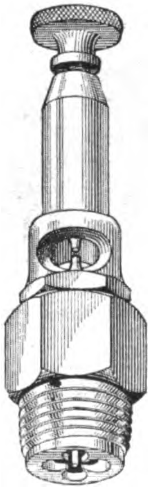
The illustrations herewith show them in detail.

The "Fore-Sight" Spark Plug

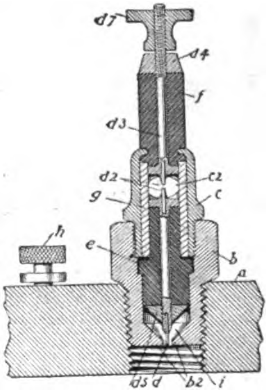
Drake, Kinel Spark Plug Co., 211 East Madison street, Chicago, Ill., have placed on the market a new spark plug called the "Fore-Sight," which is illustrated herewith both exteriorally and by a sectional, lettered cut, showing all parts in detail. This plug operates on the principle of reduced voltage, and one of its principal features is the auxiliary sparking gap, which indicates the working condition of the plug at all times.

A low voltage current will arc or spark instead of following a path of high resistance, such as that formed by carbon deposits, and as the manufacturers of this plug claim to obtain low voltage without decreasing the amperage, this plug seems sure of sparking under the worst conditions. The centre electrode is interchangeable and can be renewed for a few cents. Foreign plug sleeves can be fitted with the "Fore-Sight" plug.

This company also makes the "Multi-Point" plug, made of the same material as the "Fore-Sight," and on the same general principles, but without the auxiliary gap. The shell ends of these plugs are so shaped as to form four points to which the current may jump from the centre electrode, giving four chances for a spark.



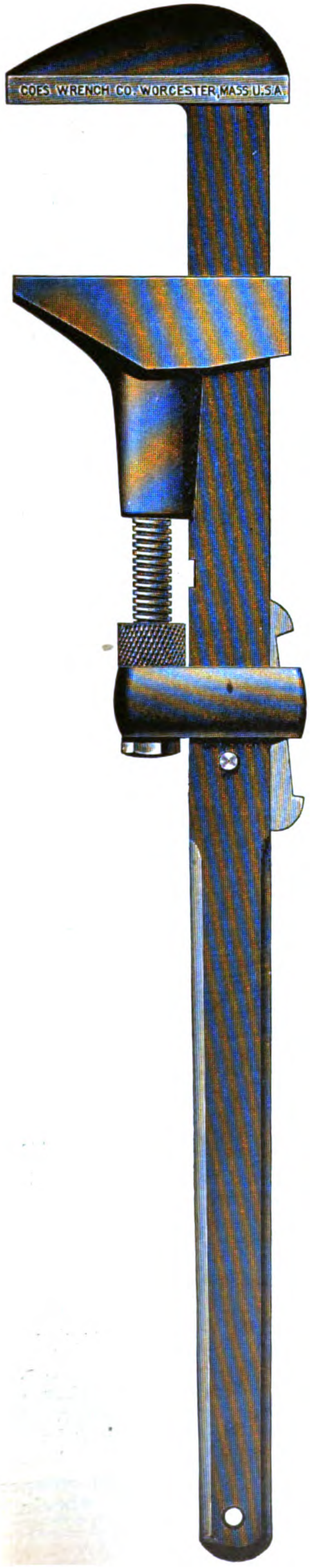
Exterior View "Fore-Sight" Spark Plug.



Sectional View "Fore-Sight" Spark Plug. a, cylinder wall; b, hollow plug; b2, ignition points; c, tubular socket engaging plug b; d, platinum point in ignition gap; d2, platinum point in auxiliary gap; d3, terminal member; d, 4, 5, 6, washers; d7, nut adjusting circuit wire to terminal; e, f, insulating bushings; g, glass or transparent mica tube; h, binding post connecting circuit wire; i, open space to prevent carbonization.

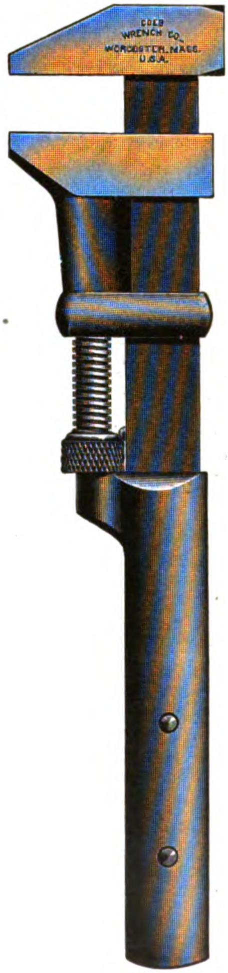
Percy Megargle, who is making a double Transcontinental trip in the "Reo Mountaineer," has his machine equipped with Bailey "Won't Slip" tread tires, and he speaks very highly of their non-slipping qualities during his recent difficult journey through the adobe country. This is certainly a very strong endorsement for the Bailey tread.

The Firestone Tire and Rubber Company office employees were delightfully entertained February 22 by President H. S. Firestone at a banquet held in the Hollenden Hotel, Cleveland. The walls and tables were beautifully and appropriately decorated with American flags to commemorate the birthday of George Washington. After the toasts were given the party numbering 37 visited the automobile show at Central Armory.


COES WRENCH CO. WORCESTER MASS. U.S.A.

IF you run a Garage or own an Auto, you need these wrenches.

The Key Mdel. (Left cut.)


COES
WRENCH CO.
WORCESTER, MASS.
U.S.A.

28in. and 36in. long, largest nut wrench made. Strong, unbreakable, handy and cheap.

Will replace a dozen forged special wrenches.

The ★91 Steel Handle (Right cut)

in seven sizes—from 6 in. to 21 in. Heat, damp, and wear proof. Steel handle. 30 per cent stronger, size for size, than any imitation or substitute.

Every wrench fully

WARRANTED.

No advance in price.

Coes Wrench Co.

Worcester, Mass.,

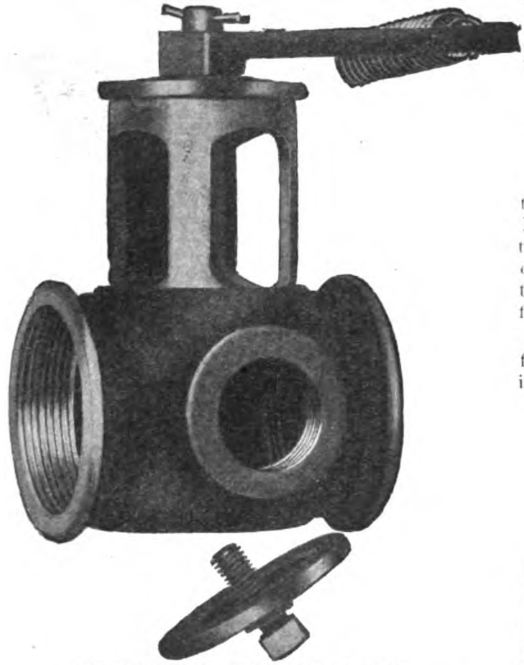
Or Your Dealer.

Ask for "Coes Genuine."

CIRCULARS

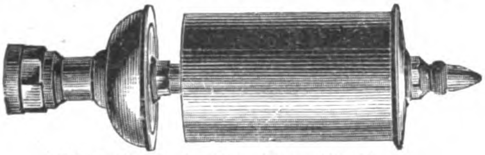
"Perfect" Whistle Valve

Garage Equipment Co., of Milwaukee, Wis., have added to their line of automobile specialties the whistle valve, shown herewith. This valve is used for blowing any kind of horn or whistle by the exhaust of the engine. Any steam whistle can be used.



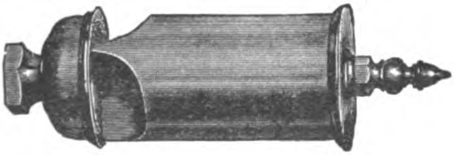
"Perfect" Whistle Valve, showing parts.

It consists of a light casting which can be threaded to fit any size of standard pipe or machined to fit any size steel tubing. It has three openings, one at each end, into which the exhaust pipe is fitted, and one at right angles for the attachment of a one-inch standard pipe which leads to the horn or whistle wherever located.



"Perfect" Single Tone Chime Whistle.

In the centre is a cylindrical valve with three openings which when not in use offers no obstruction to the exhaust. When turned at right angles the pressure is forced through the whistle at any desired pressure by swinging the valve entirely open or part way. It can be applied by any machinist in a very short time.



"Perfect" Three-Tone Chime Whistle.

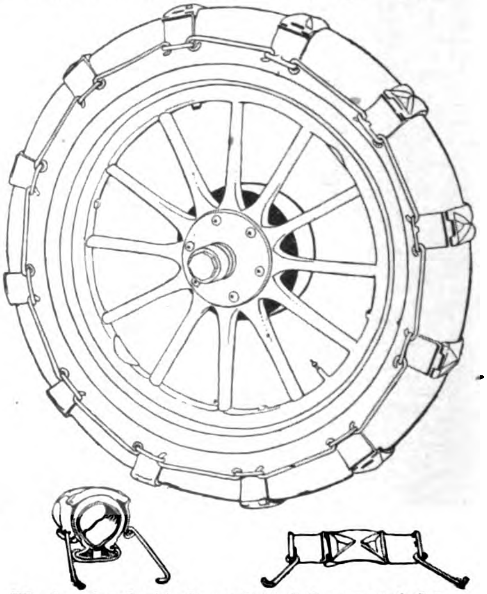
They furnish these valves in blanks to fit any size of exhaust pipe, threaded to fit 1 in., 1¼ in., 1½ in., 1¾ in., 2 in., and 2½ in., standard pipe sizes or machined to fit the same sizes of steel tubing. Price, blank, any size, is $2.75; machined or threaded, $3.00. Their style F pedal for operating the valve from the footboard lists at 75 cents.

They are also furnishing one- and three-tone whistles ranging in price from $2 to $8, including all connections to valve.

"Queen B" Mud Creepers and Tire Protectors

The Queen B Mud Creepers and Tire Protectors, manufactured by Queen B Mfg. Co., Marshalltown, Iowa, are easy to attach or detach and cover 30 per cent. of the tire's circumference. They will not cut or wear on the tires, as they are 2 inches wide on the face.

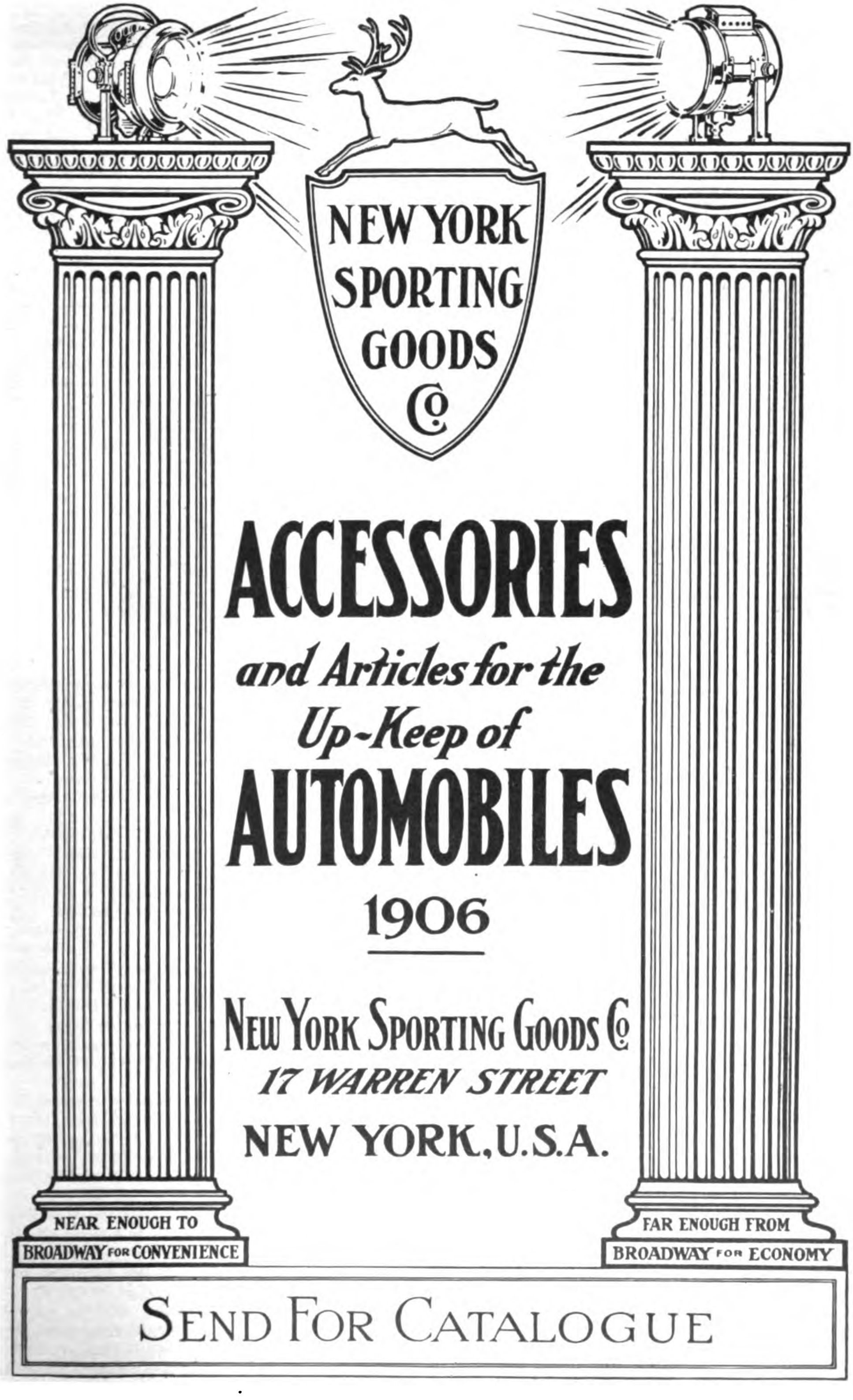
These protectors can be put on without deflating the tire and are positive non-skidders in mud, snow or ice, etc. No one part is subjected to strain, as the car weight, when going over each creeper, makes a downward pressure, which relieves all parts from extra friction, making them wear well.



Wheel equipped with Queen B Mud Creepers and Separate Mud Creepers.

Each creeper when placed on the tire overlaps on each side nearly to the felloe. The method of holding in their respective places, is by rods connecting them at the ends near the felloe, these rods encircling the tire near the rim of the wheel. Each rod, however, is only fastened at one end and the other end hooks into a hole in another creeper, thus each creeper is connected with two rods, one fastened and one loose.

The prices for the Queen B mud creepers range from $8 per pair for 2½x28 wheels to $13 for 4, 4½, or 5x36 wheels.



NEW YORK
SPORTING
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ACCESSORIES

and Articles for the
Up-Keep of

AUTOMOBILES

1906

New York Sporting Goods Co
17 WARREN STREET
NEW YORK, U.S.A.

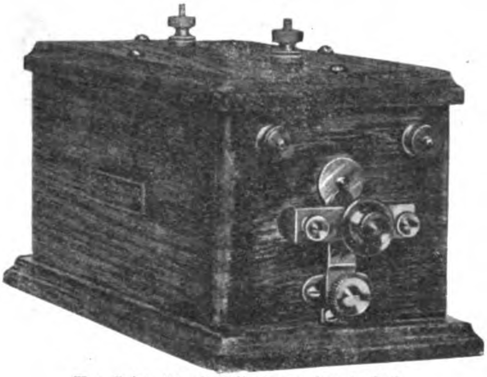
NEAR ENOUGH TO
BROADWAY FOR CONVENIENCE

FAR ENOUGH FROM
BROADWAY FOR ECONOMY

SEND FOR CATALOGUE

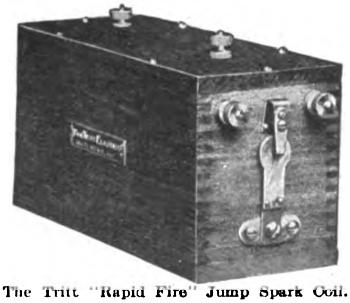
Tritt "Veribest" and "Rapid Fire" Jump Spark Coils

The extensive line of ignition outfits manufactured by The Tritt Electric Co., Union City, Indiana, include the "Veribest" and "Rapid Fire" jump spark coils which are provided with either iridium, glass-hard contacts or extra large platinum iridium contacts.



The Tritt "Veribest" Jump Spark Coil.

The "Veribest" jump spark coil is equipped with the "Veribest" or compound vibrator and the windings are of liberal proportions to give the highest efficiency with a minimum amount of current consumption. It is furnished in highly polished oak boxes with dovetail joints and brass trimmings with instrument finish or nickel plated. The list prices range from $6.50 for the single unit coils **with iridium glass hard contacts to $25** for the quad coils. With extra large platinum iridium contacts the prices range from $5.50 to $21. Either compound or "Rapid Fire" Vibrators are furnished, the latter being cheaper.



The Tritt "Rapid Fire" Jump Spark Coil.

The "Rapid Fire" jump spark coil is equipped with the "Rapid Fire" or single vibrator and is designed especially for stationary gas engine use although, on account of the extreme rapidity if its vibrator it is being successfully used on 2-cycle marine engines as well as other high speed engines. With a slight modification of the vibrator, as shown in the cut, it can be used on dash coils for automobiles. The list prices range from $5 for single units to $20 for quad units with iridium glass-hard contacts, and is also made with the extra large platinum iridium contacts at less prices.

The dash coils are built on the unit plan unless otherwise specified and one coil may be taken out of the case and replaced without disturbing the wiring or the other units. The single, triple, quad and sextuple coils are made exactly like the double coil shown herewith which is equipped with the "Veribest" or compound vibrator.

The difference in price between the two different vibrators is due to the one being cheaper to construct than the other although the wearing qualities are practically the same. The "Veribest" vibrator is of the compound or double spring type and is so constructed as to be capable of doing good work under a very wide range of adjustment. The adjusting screw which carries the contact point is tightend by means of a cone shaped split stud screw upon which screw a clamping nut. This method of locking the adjusting screw gives a fine, accurate and positive adjustment. Another adjusting screw is so arranged as to either weaken or strenghten the vibrator springs. A thumb screw on each end of the cross-bracket holds it in place. By removing these screws the cross-bracket carrying the clamping nut and adjustment screw can be removed for cleaning the contact points. A screw driver is not needed to change the adjustment of this vibrator.

The Tritt Double Dash Coil.

Each dash coil is furnished with grades No. 1, 2, 3, or 4 units according to price. Each unit is made of standard windings, installed in a sycamore box, dovetailed and finely finished and hard rubber capped, the Nos. 1 and 3 units carrying "Veribest" or compound vibrators and "Rapid Fire" or single vibrators respectively. Both are equipped with iridium glass-hard contacts. Nos. 2 and 4 units are equipped with "Veribest" and "Rapid Fire" vibrators respectively, with extra large platinum iridium contacts. List prices range from $6.50 for the No. 4 unit to $8.00 for the No. 1 unit.

The list prices for the dash coils are according to the style of case and units used, but the prices for the coils according to the number of the units used ranged from $9.50 to $12.00 for the single dash coil to $40.00 to $50.00 for the sextuple dash coils.

The Rushmore Dynamo Works, 629 South avenue, Plainfield, N. J., to take care of their increasing Western trade have established a new branch office at 1328 Michigan avenue, Chicago, where a full stock of Rushmore searchlights and generators will be carried. One of their 18-inch projectors has been mounted on the roof and its beams are visible forty miles away.

WE WANT TO BUY

BUICKS

If you have a second-hand Model "C" 1905 Buick touring car for sale, communicate with us at once.

Jaynes Automobile Co.

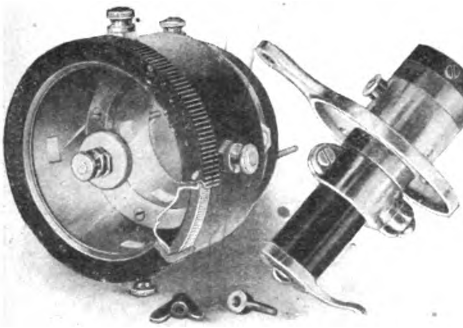
Buffalo, N. Y.

The Bemus High Tension Distributor

T. Alton Bemus, 294 Washington street, Boston, Mass., whose "Duro" timer is well known to the trade, has lately brought out a distributor for the high tension current in jump spark ignition systems.

This distributor uses but one coil for any number of cylinders and is made to fit any style of gasoline motor.

An important feature of this distributor is the fact that the cylinder or cone has a glass in front, so that the operator can see at all times just what is taking place on the inside. Of course, the secondary current is fed through a contact or binding post set in this glass and carried off on to the distributing arm without a spark gap by means of a self-adjustable ball contact. Another advantage lies in the fact that two wing nuts disconnect the cylinder or cone so that it can be slipped off (carrying all wires with it) exposing the whole interior and affording an opportunity to make adjustments. If it is desired to take the rest of the distributor apart, it may be done by loosening one screw in the primary brush. This allows secondary brush and insulated shaft to be removed. Primary brush may also be stripped off and the aluminum casting which is the advance and retard arm may be removed from the steel shaft. When the primary brush is removed the ball contact and spring behind it may be examined.



The Bemus Distributor, Disassembled.

The material used and mode of constructing this distributor insures it against short circuiting, the worst fault an instrument of this kind could have.

This distributor is positive and self-adjusting because the ball in the primary brush, being held in an outward position by centrifugal force and a spiral spring, rolls and wipes in its socket and pushes aside any foreign substance as it crosses the contact plates. This ball closes the circuit the instant it touches the contact plates, and because these plates are square and equidistant, the circuit is closed at the proper instant, thus avoiding late ignition.

In this distributor a steel bushing is placed over the end of the time shaft and secured by a set screw. On this steel bushing rides a phosphor bronze bushing, one and one-half inches long, which has been secured to an aluminum casting by pressing it through the hub. In this hub is an oiler for the bearing.

The steel bushing has a split end over which the primary brush is placed and into which the insulated shaft is secured by tightening the clamp of the primary brush. The primary brush is a composition casting with a boss and into this boss a tool steel socket is screwed.

The ball and spiral spring are placed in the brush before it is put on the steel bushing. The insulated shaft is of hard rubber and the secondary brush is a composition casting placed over end of the insulated shaft and secured by two screws. This brush has a self-adjustable ball at the centre, so that the high tension current may be carried onto the brush from the binding post in the glass without a spark gap. The secondary brush just passes by secondary contacts or binding posts which makes a very small spark gap. Primary part of cylinder is made of hard fibre and contacts are connected by metal band passing around outside, so that the primary current is fed to one binding post and then around this band to the contact plate which the ball in primary brush happens to be opposite in its course.

The bearing is long and made of phosphor bronze running against a steel bushing. The list prices are $18 for the 2-cylinder device, $20 for the 3-cylinder or 4-cylinder type, $30 for the 6-cylinder type and $34 for the 8-cylinder type.

Acme Aluminum Castings

The proprietor of the Acme Foundry Co., P. O. Box 181, Madison Square, New York City, has had many years' experience in foundry work and of late has paid special attention to aluminum casting. His secret process for making moulds and cores gives an exceptionally clean, smooth surface to the castings, and he makes strong claims for the high finish of the aluminum parts he turns out. Acme castings are also said to be of high tensile strength and elasticity and very light. This foundry makes a specialty of small aluminum and brass castings. An order of fine castings for air-ship work was recently finished for Leo Stevens, and Acme castings are found eminently suited to this sort of service.

The Aerocar Co., of Detroit, Mich., are rapidly erecting a large addition to their already big plant and will therefore not break their promises for deliveries. Their initial output for the year was placed at 500 cars, but at the New York show more than half this number was sold and there were not enough left to supply the demand at the Chicago show.

Lyon quick repair cement and acid cure solution, marketed by The Beckley-Ralston Co., Chicago, Ill., and made by the Lyon Rubber Co., Akron, Ohio, is said to permanently unite and vulcanize all grades of rubber, used for any purpose without hot presses, steam boilers or vulcanizers. It will not injure the finest rubber and is manufactured expressly for patching inner tubes, repairing cuts, etc.

HERE YOU ARE!

We have got something you have been looking for

WHAT IS IT?

It's an Engine operated by Kerosene Oil. Smokeless and Odorless—newest and best. Any power from 10 to 60 Horse Power. Vertical or Double Opposed.

The ONLY
OIL ENGINE
for Automobile Use

Say our transmission is O. K.
Absolutely Fool-Proof any Speed
The Perfect our motto.

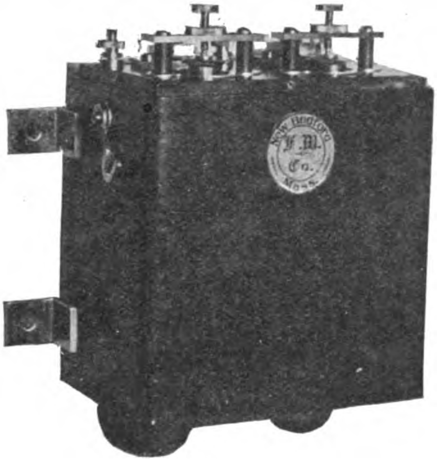
St. Anne Kerosene Motor Co.
St. Anne, Ills.

See our next issue
Catalogue for asking

The F. & M. Plug and Coils

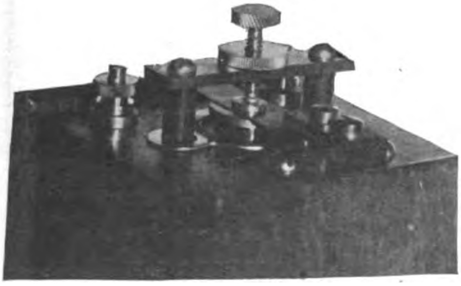
The Faulkner-Mills Co., Fourth and Spring Sts., New Bedford, Mass., are manufacturers of high class ignition apparatus, their automobile spark coils and spark plug being shown herewith.

A special feature of the coils is the moisture and puncture proof insulation, which is guaranteed against 20,000 volts. This insulation is a chemically treated cloth, the actual insulation of which is 20,000 to 25,000 volts. The windings are of the best silk covered wire of the highest conductivity, wound on machines, especially designed for this work.



The F. & M. double coil, No. 2a.

The condenser is extra large, and is so connected that it is claimed to be utilized to the very best advantage, reducing the sparking at the points to a minimum. The coils are adapted for very high speed (up to 3500 R. P. M.) They are put up in boxes of mahogany, oak, and rosewood.


End of F. & M. coil, showing vibrator.

The marine type of coils included in the 46 types made by this company have a cover which fits over the vibrators, so that they are entirely moisture proof. The electrical and mechanical workmanship and finish are of the best that experienced men and machinery can accomplish.

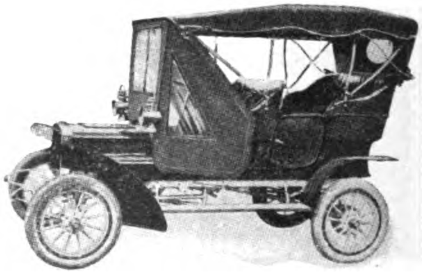
The F. & M. spark plugs have been very carefully designed with a view of correcting all usual shortcomings. The insulation consists of a dry mica tube, which is put over the centre electrode, and over this tube are put mica washers. High pressure is then applied and the insulation turned and fitted to the shell in such a manner that packing is unnecessary. The plug has a very large air space, which prevents short circuiting by deposits of oil or carbon. Only pure imported India mica is used.

The F. & M. spark plug.

The contact points are of pure nickel, which does not oxidize at the highest temperature, and this plug, as well as all other goods manufactured by the Faulkner-Mills Company, is guaranteed for one year.

"Wishbone" Tops

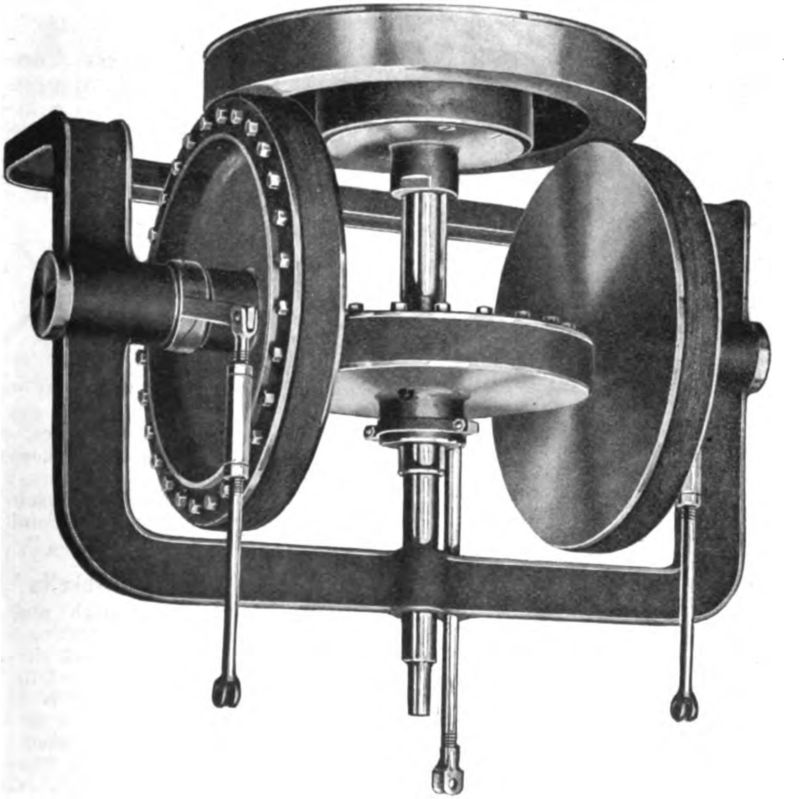
Detroit Motor Car Supply Co., Detroit, Mich., put out a line of tops under the trade name "Wishbone," the one shown herewith being furnished complete with side curtains, storm fronts and body irons at $150. "Wishbone" tops are made in 32 oz. rubber duck, imitation or chase leather, three-ply mackintosh in various colors, or khaki canvas. Fifteen styles are carried in stock from which to select. The side curtains are made of the same material as the top proper. They are fitted with large side lights and double lap edges with glove fasteners. The two side sections have triangular lights and can be attached from the inside of the car. The storm front is made in three pieces, the centre section having two large lights 20x30 in. and being fastened to the front of the bow, it can be rolled up and strapped out of the way. The bows are gracefully curved, made of wood and given the natural finish or finished in colors, if desired. They are reinforced by highly polished brass slat irons. The joints and props are made of drop forgings with highly polished brass plating or black rubber finish as ordered. A handy parcel carrier is placed on the roof of these tops without extra charge.


"Wishbone" $150 Standard Top.

The Victor Rubber Co., Springfield, Ohio, are large manufacturers of rubber mats and matting, making them in a large variety of styles and patterns and for various purposes. Their mattings are made in two grades, Nos. 100 and 200, the first being the better. They are paying special attention to the automobile trade and are prepared to furnish special widths and patterns where stock goods do not meet requirements.

Are You Satisfied

With **your** Transmission? Are the three or perhaps four speed changes enough for **you?** Don't you **often** wonder how long the gears will **stand** that clash and jar **each** time you shift them?



The Gearless Transmission

No gears to give **trouble.** Unlimited number of speeds.
No oil bath. **Direct drive on high speed.**

The Gearless Transmission

Noiseless. Speed changes "quick as a wink." Fool proof.
Low cost of maintenance. Ball and Roller Bearings.

There isn't much **pleasure** in shifting **your** toothed gear is there? And just examine the teeth **after** a season's wear! Don't you think that this question of transmissions is worth **your careful investigation?** Write us **to-day** for catalogue. Equip your **present** car with **the Gearless.** "We can show you how."

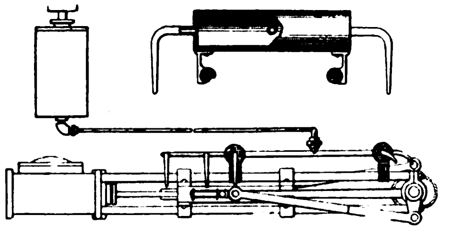
GEARLESS TRANSMISSION COMPANY, Rochester, New York

Our factory and office has been removed to Rochester to enable us to secure the necessary facilities to supply the demands for Gearless Transmissions.

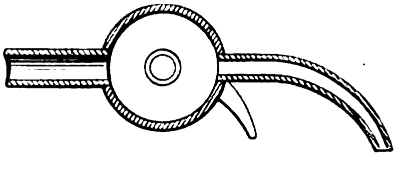
The Russell Lubricator

The Russell Lubricator, made by Hight & Niles, is for oiling the outside bearings of the Stanley steam engine. It oils the main shaft bearings, 4 eccentrics, the gear, connecting rods, ball cross heads, the links and valve stem guides, all of which is accomplished by a mere pressure of the thumb.

By means of a pump in the centre of the oil cup the oil is forced through a flexible pipe to the two large pipes, one on each end, which are connected to small copper pipes leading to every bearing. These pipes are so arranged as to feed a definite amount of oil to each bearing when the plunger of the oil cup is forced down. This plunger originally worked automatically, but experiments proved that better results were obtained by working it by hand every fifteen or twenty miles traveled, according to the condition of the road and the amount of work done by the engine. The oil pipe next the cylinder oils the valve rod guides. The next one oils the links and eccentric rod ends. The one from end of large pipe oils the ball bearing cross heads, and the upper ball flows over, oiling the cross-head pins and down the lower ball. The opposite side of engine works the same. A copper pipe with union connects the two large pipes together, distributing oil equally to each of the large pipes. From the large pipe next the crank shaft run small pipes to the following bearings: One to each of main bearings, one to each set of eccentrics, and one to the gear. A small pipe from each end of the oil cup is so adjusted that the connecting rod coming around wipes the oil off the end of this pipe when the engine is in motion.



The Russell Lubricator Attached to Stanley Steam Engine.



Small Pipe leading from Main Oil Pipe to Individual Bearings in the Russell Lubricator.

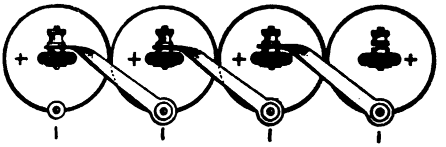
The oil cup may be placed on the dashboard and fastened with two screws, convenient to the operator of carriage, and when the plunger in the oil cup is forced down, the oil flows to every bearing in the right quantity. Each oil cup is fitted with screen to prevent dirt entering, when filling cup. Every oiler is accurately fitted to an engine, and each pipe is adjusted to its proper position and thoroughly tested before being shipped.

For carriages with the boiler in front the oil cup is made to fit on the dashboard, but for a runabout, with boiler under the seat, the oil cup can be fitted either back of the apron or near the steam gauge. The half-round metal cup, fitted to the dashboard, is preferable, but round glass cups are furnished if desired.

This oiler is easily fitted to the engine, requiring about half an hour's time. It is held in place by one screw at each side and a small clamp, thus making it easy to put on or take off. The best results are obtained by using the oiler when the engine is running and allowing the engine to pick up all the oil as it comes direct to the bearing.

Shain's Strip Battery Connection

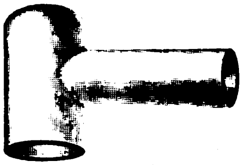
Chas. D. Shain, 70 Murray street, New York City, has brought out a new battery connection made of a one-piece specially prepared copper strip. With it there are, of course, no soldered joints. The connectors are flexible and are not liable to work loose from the binding posts. The same size of connector serves to connect Nos. 6, 7, or 8 dry cells, the position of the negative posts being shifted a little on the Nos. 7 and 8 to give the proper distance between the positive and negative posts of adjoining cells.



Shain's Strip Battery Connection.

The Plug "Umbrella"

Plug Umbrella Co., High and Congress streets, Boston, Mass., are putting out a spark plug protector which they call the Plug Umbrella. The protector is especially useful on marine engines where water is liable to be splashed on the plug. It is made of rubber, consists of a main cylinder closed at one end and having a tube branching from one side, as shown in the cut herewith. On account of the flexibility of the "plug umbrella," it is easily applied, and when applied it provides complete protection to the plug. To apply the closed end is bent back on the small tube and the terminal passed in at the small hole. Then the plug is attached to the terminal and main tube down drawn over the plug. A washer is furnished to use if necessary so that a close fit around the plug can be obtained. Price of the Plug Umbrella is 50 cents by mail. The rubber used in this device is a very high quality rubber properly compounded and vulcanized to withstand extreme heat.



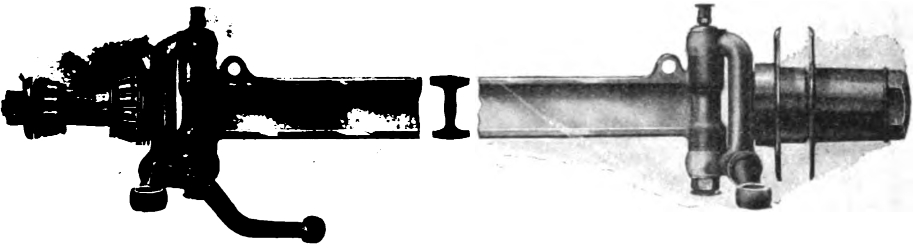
The Plug "Umbrella."

It is necessary that the axle construction of heavy commercial automobiles be of the very best, as it is this part that is subjected to the severest strains in daily use.

TIMKEN

Auto Truck Axles and Bearings

are noted for the satisfaction they give on commercial vehicles, being used and endorsed by the largest manufacturers of auto trucks in the country.



The following Letter may be of interest:

SPRINGFIELD, MASS.

After using Ball Bearings on hundreds of automobiles and making thorough and exhaustive tests with various kinds of Roller Bearings that are now on the market, also with other types of tapered bearings, are pleased to state that we have received by far the most satisfactory results on pleasure cars and commercial vehicles and heavy trucks with your bearings and have decided to use them on all of our cars.

We believe they are superior in every way to any plain roller or ball bearing manufactured or sold in the world. We have given them very severe trials on the most important bearings in our transmissions and they have stood the test perfectly.

HARRY A. KNOX,
of Knox Motor Truck Co.

Write for booklet and full particulars regarding TIMKEN Axles and Bearings for commercial cars

Timken Roller Bearing Axle Company

Works and General Office **CANTON, OHIO.**

EASTERN BRANCH—219 W. 46th St., New York City.

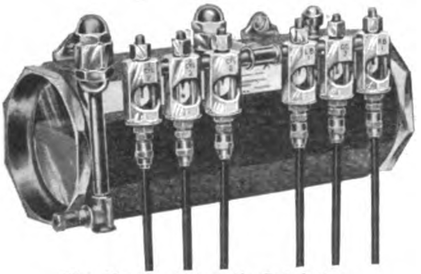
"Black Hawk Dry Cell with Corrugated Case

The "Black Hawk" is a new dry cell recently placed on the market by Central Electric and Battery Manufacturing Co., 1525 Second avenue, Rock Island, Ill. One of the claims made for this cell, on which special emphasis is laid by the makers, is that it possesses great recuperative powers and long life. These qualities have been obtained, it is claimed, without sacrificing voltage or amperage. This cell has a corrugated zinc tube providing a large zinc surface, is provided with an amalgamating generating matter to protect the zinc, and means are provided for the escape of gas, which, if allowed to accumulate in the cell, would work injury to the zinc.

The core or filler is composed of necessary chemicals surrounding and firmly pressed about the carbon pencil. This filler is inserted into the corrugated zinc can and the space between this filler and the inside wall of the can is filled with a generating paste, composed of strong chemicals, according to a new secret formula. This paste is self amalgamating, and by amalgamating the zinc the latter is protected against the too vigorous attack of the chemicals.

"Charter" Automatic Lubricators and Spark Plugs

The "Charter" Automatic Lubricator, manufactured by the Charter Specialty Mfg. Co., 59 Clark st., Chicago, Ill., is a simple, reliable sight feed oiler which can be used on any make of combustion engine, as no mechanical or moving connection is required. The outlet is on top of the oil tank and the oil can only flow when pressure is created by the running of the engine. This pressure is concentrated on top of the oil and forces it up and out through each sight feed, the amount being regulated at each feed by an adjusting screw or valve. When these valves are once adjusted the flow of oil is thereafter constant and uniform.



The Charter Automatic Lubricator.

An unusual feature of this oiler is the fact that it feeds oil against pressure as well as to open journals from the same reservoir. The flow of oil is not affectd by back pressure. The supply of oil increases with the speed of the engine and vice versa, so that waste is practically eliminated. The oil reservoir can be placed at any convenient position and the sight feeds can be grouped at one place or distributed to suit the convenience of the operator.

The number of sight feeds used is optional. Being automatic, with no moving parts, the life of this oiler is indefinite and no readjustments are necessary.

THE CHARTER AUTOMATIC SPARK PLUG.

Their automatic spark plug is made to fit standard openings and can therefore be made on any standard make of engine. No wrenches or tools are necessary in removing the mica core for inspection or cleaning the insulator, as a thumb-nut projection serves this purpose. This taking apart can be quickly and easily accomplished by one-quarter turn of the top of the plug.

The Charter Automatic Spark Plug.

The necessary gap for the proper ignition is accurately regulated by self-adjustment.

The Charter Specialty Mfg. Co. also manufacture check valves, back-pressure checks, unions, elbows, and such special fittings as are used in the oiling system of engines, automobiles, etc.

Shiels Panel Boards for Automobile Bodies

An extensive line of panel boards for automobile bodies is made by Charles F. Shiels & Co. of Gest St. and McLean Ave., Cincinnati, Ohio. In order to obtain the proper texture and extraordinary widths necessary in this selected stock they are compelled to go to the deepest recesses of the Great Smoky mountains, bordering North Carolina and Tennessee, as the timber from which this class of lumber comes is now practically extinct in other States.

They carry at all times a complete stock of ⅜ in., ½ in. and ⅝ in. soft clear yellow poplar panel boards from 33 to 44 in. wide, which are used for the bent sides and rear panels of automobile bodies and are one of the very few concerns who carry this stock.

They also carry an extensive line of ¼ in., ⅜ in., ½ in., ⅝ in., ¾ in., and ⅞ in. yellow poplar panel boards from 10 to 24 in. wide, which they ship in either small or carload lots. At present they are making a specialty of a rich, dark colored mahogany in all thicknesses, which runs very largely to the "figury" effect, so necessary to give mahogany trimmed automobile bodies the proper amount of contrast in richness of effect.

They also carry a complete stock of selected second growth ash, hickory, and tough white oak, also thin planed yellow poplar for the lighter roofing parts of automobiles, also coach roofing.

Joseph Grossman has succeeded E. J. Kuegeman as manager of the National Sales Corporation, 256 Broadway street, New York City. He has been for fifteen months advertising manager and purchasing agent for the Continental Caoutchouc Co.

Patent Notice

Annular Ball

Bearings

This Company owns a number of United States patents which broadly cover annular bearings of the full and silent type, and among these your attention is directed to Nos. 417,340 and 434,472. This Company is taking immediate steps to protect its exclusive rights under these patents, and its patent attorney, Augustus B. Stoughton, of 1506 Land Title Building, Philadelphia, Pennsylvania, is now bringing suit for the collection of past damages and profits and for a preliminary injunction against the Hess Bright Manufacturing Company, importers' agents and suit will be brought against the Cadillac Motor Car Company and the Lozier Motor Company, users, as soon as papers can be prepared.

The trade is hereby notified that we will hold all makers, importers and users of domestic or foreign infringing annular bearings, of either the silent or full types, liable for both past damages and profits, and will forthwith take steps to enjoin the continuance of any such sale or use.

Standard Roller Bearing
Company

Philadelphia, Pennsylvania

The "Buckeye" Dividing Top

The Wm. F. Kramer Top Co., 34-36 North Canal street, Dayton, Ohio, have recently placed on the market an ingeniously designed automobile top, the invention of Wm. F. Kramer. This top is suitable for either touring cars or runabouts, being divisible into two separate parts. It is of the canopy type, and when curtains are drawn it affords the comfort of a closed body, such as a brougham. The rear part is easily detached with the rear seat, but when joined together makes a perfectly water-tight connection, providing a canopy over both seats.

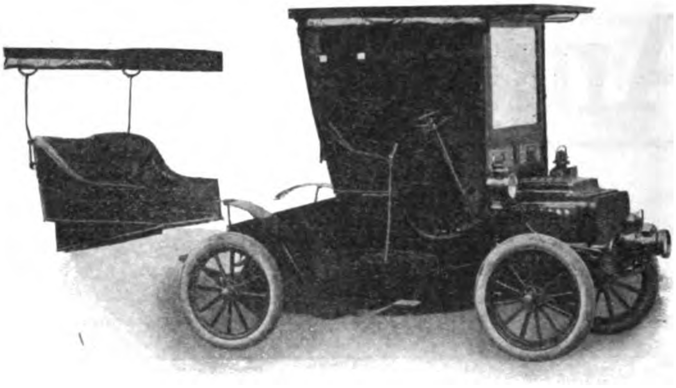
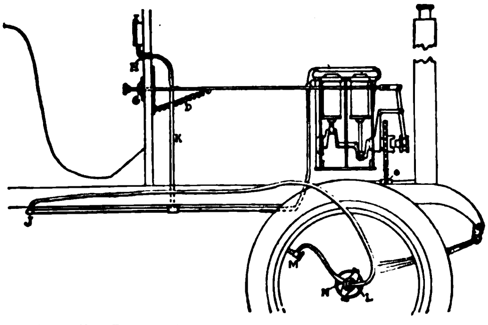


Illustration of the "Buckeye" Dividing Top, showing it attached to car and also with rear part removed with tonneau.

Another feature of the Buckeye Dividing Top is the large front window, which is of much larger dimensions than is usual, and is mounted in such a manner as to entirely prevent the entrance of rain or wind. This window is easily placed in and out of position without detaching it from the top. The Kramer Co. are manufacturing this top for the trade and are also desirous of granting shop rights on a royalty basis.

Tiley-Pratt Automatic Tire Pump

An automatic tire pump recently placed on the market by the Tiley-Pratt Co., Essex, Conn., not only enables the automobilist to inflate the tires by engine power while the car is stationary, but also keeps a punctured tire inflated while the car is in motion, a special hub arrangement being used.



The Tiley-Patt inflating device with which a punctured tire can be kept inflated while in motion.

For running the car with a punctured tire an attachment is put on the hub and the pump is placed in driving connection with the engine. The pressure maintained in the tire is indicated by a gauge.

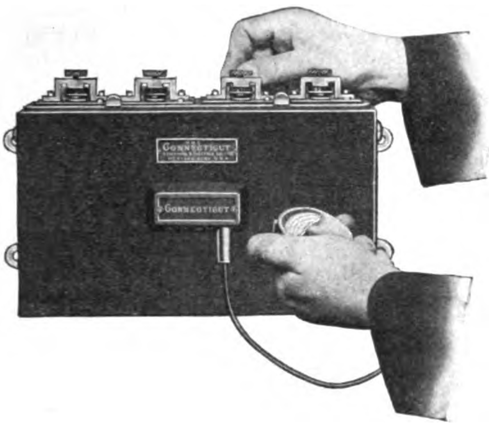
The pump is driven by the engine through a chain, a free sprocket wheel being mounted upon the pump shaft, which can be fixed to the shaft by means of a positive claw clutch actuated by means of a knob located on the dashboard or any other convenient place. A coiled spring normally holds the claw clutch out of engagement. As soon as the air in the cylinder attains a certain pressure it opens a spring-pressed valve and flows out to the tire or pressure reservoir.

The hub attachment consists of a cap which is slipped over the hub cap and locked by a clamping bolt. A circular flange on top of this cap is threaded on the outside to receive a fitting, forming part of a conical revolving joint. The revolving part of this joint is connected by a rubber hose to the tire valve, while the stationary part connects to the tire pump. This pump can easily be installed by any machinist. It is installed near the engine, under the hood, with front placed engine, or under the seat when an engine is located in the middle of the chassis.

When inflating tires, with the car standing, the hub connection is unnecessary, the connection being made direct to the tire. An ordinary tire can be inflated in sixty seconds from an absolutely flat condition.

The list price is $35 ready to install, the equipment comprising pump, hub connection, pressure gauge and necessary fittings.

The top materials furnished by L. C. Chase & Co., 129 Washington street, Boston, Mass., are coated either with Chase leather or with genuine leather grain and rubber, the two former in a variety of colors and the leather grain only in black, but in several styles of embossing and in dull or bright finish. Their very large assortment of fabrics in twill, duck, whipcord, etc., are made either in single texture (coated directly onto the cloth) or double texture, in which case the goods are joined to a fine sheeting with a waterproof cement and then coated with either Chase leather or rubber.



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The Connecticut Spark Coils

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The **WORLD'S RECORDS** in the **RUNABOUT** and **CU. IN. DISPLACEMENT** Classes were made with cars equipped with **CONNECTICUT COILS** at Ormond, Fla.

It only costs a postal to secure a copy of our handsome Catalog No. 12 C and full particulars regarding our

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It costs nothing to try a coil and the chances are 9 out of 10 that it will improve the running of your car.

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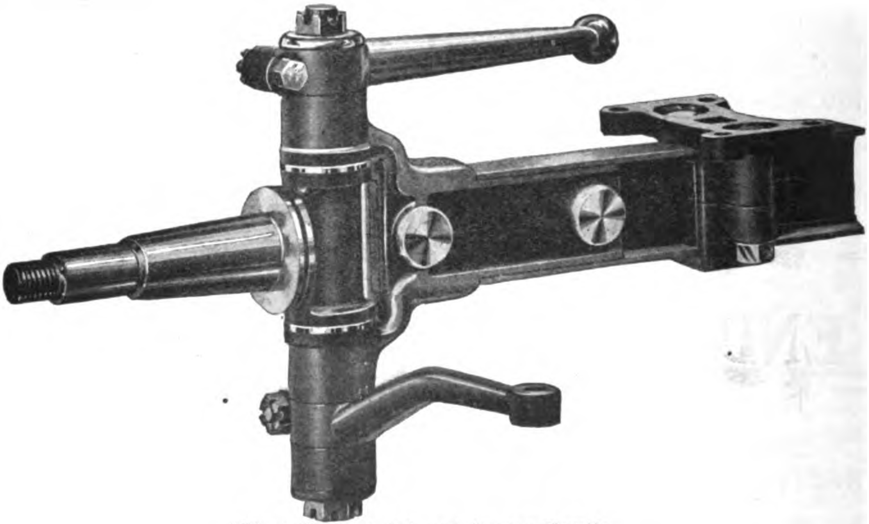
Diamond Steering Knuckles and I Beam Axles

The Diamond Chain and Manufacturing Company, of Indianapolis, Ind., have decided to extend their business in the direction of making automobile parts and automatic machinery. Their plant for making chains is already the largest in the world, and thoroughly equipped for that business. They have also a very large machine department and have decided to put out a few standard parts, as well as to devote their efforts to the manufacture of automobile parts from individual specifications. Exclusive selling arrangements have been made with Hayden Eames, of Cleveland, Ohio, to market this end of the "Diamond" product.



"Diamond" Front Axle and Steering Knuckle.

The first standard part the Diamond Company offers is the "Diamond" I Beam Axle and Steering Knuckle, shown herewith, and made under the Lindsey patents. The I beam of special section is rolled straight from one piece of stock, in either 50-carbon stock or chrome nickel steel, eliminating welds and brazed joints. The forgings of yokes and spindle are simple and the factor of safety exceptionally large.

The steering arms can be adjusted to suit any desired coupling, front or rear steerer or right or left, with same parts.

The yoke bearings hold the wheel in a vertical line, and the T-shaped spindle gives great bearing surface. The spring seat is adjustable to any desired position, is strong, rigid and they claim will not flatten from action of spring.

The entire axle permits of light construction, and has been designed for safety, strength, and long life. It is adapted for cars of light weight, and particularly recommended for touring cars and light trucks.

The axle will be equipped with hubs of special design, fitted with ball or roller bearings.

The Diamond Company is also prepared to machine parts on contract, taking orders for this work through Mr. Eames.

London Tops and Simplex Wind Shields

London Auto Supply Co., 1229-1231 Michigan avenue, Chicago, Ill., manufacture automobile tops in 3-bow, runabout, and extension styles. These tops are furnished with small electric lights at the four corners or at corners and at each bow, 4 or 6 lights being furnished. Another important feature of London tops is the curtain hung at the back of the front seat.

The materials used are Pantesote and the best grades of Mackintosh top coverings. Bows are selected second growth ash. The steel sockets are covered with hand buffed patent leather, and furnished either in straight or bent style. They are made especially to order for this firm. The fasteners are of solid brass and the straps have brass snaps and buckles. The Norway irons used are forged to proper shape and proportions to stand the strain to which they are subjected. The celluloid in the roll fronts is heavy (15-1000 in.) and medium thickness is used in the side and rear curtains. All London tops have heavy pads on quarters to hold them in shape, with wide webbing and cross stays, which prevent the roof or deck material from stretching. The back stays are made triplex (two thicknesses of top material and an interlining) and reinforced with strips of steel to prevent sagging. All the curtains are given generous edge turn to prevent tearing or pulling.

The rests for the tops, when folded back, are made with a heavy pad to protect bow sockets from wear. This rest is made of a wooden block covered with patent leather, padded on top and provided with handsome substantial straps for securing top.

The Simplex wind shield frame is made entirely of seamless brass tubing, slotted to receive quarter inch plate glass, set into a felt cushion, on wood, bottom bar detachable for adjusting, or for taking out, or putting glass, when necessary; braces are attached to frame by heavy lugs, brazed and rivetted on to the

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Write for Descriptive Pamphlet

Witherbee Igniter Company

541 WEST 43d STREET, NEW YORK CITY

uprights, latter are tapered at bottom to fit brackets, which are attached to dash. Braces are attached to car at the proper distance forward for strength and appearance and to the frame uprights by brazing and rivets. These braces are in two pieces, the one fastened to the top being hollow and sliding down the other piece, which fits into it, when the folding top is lowered. To fold down the top part of the shield it is only necessary to loosen the two bolts on the hollow parts of the braces and let them slide down.

The shield can be detached from the car by merely loosening the nuts on the front braces and lifting the uprights from their sockets.

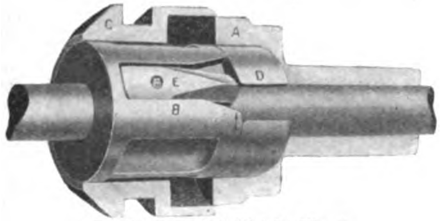
The list price is $60, fitted and ready to attach to the car. Five dollars extra is charged for attaching to car.

This rest is made of a wooden block covered with patent leather, padded on top and provided with handsome substantial straps for securing top.

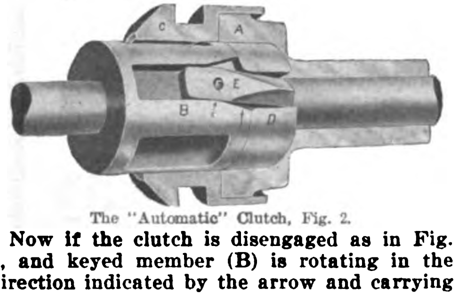
The runabout tops weigh 45 pounds and the extension tops 60 pounds.

The "Automatic" Clutch for Automobiles

The Automatic Clutch Co., Akron, Ohio, have brought out a type of their "Automatic" Clutch especially designed for automobiles. The cuts herewith showing the features of this clutch in Figs. 1 and 2 are sectional views of the Automatic Clutch, Fig. 1 showing it disengaged and Fig. 2 engaged. (A) is the loose member which forms the cup. (B) is the tight member which is keyed to the shaft and upon which is mounted the sleeve (C). The expansion ring (D) is loosely placed within the cup of the loose member (A), the ends of the ring (D) are held apart and form a gap for receiving the expanding lever (E) which is shifted with the sleeve (C) by means of the pin (F).



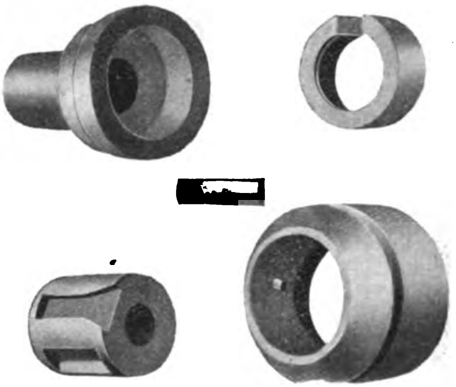
The "Automatic" Clutch, Fig. 1.



The "Automatic" Clutch, Fig. 2.

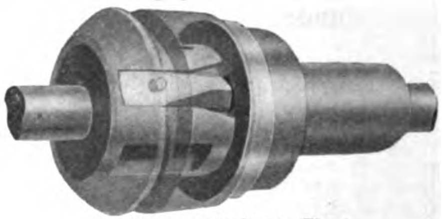
Now if the clutch is disengaged as in Fig. 1, and keyed member (B) is rotating in the direction indicated by the arrow and carrying the lever (E) and the sleeve (C), the expansion ring (D) remains at rest with the loose member (A), as both are independent of the revolving parts.

When the sleeve (C) is moved to the right it causes the lever (E) to engage the expansion ring (D) and rotates same with the member (B). This does not cause the clutch to engage, but a further movement of the sleeve (C) causes the lever to take the position shown in Fig. 2.



The "Automatic" Clutch, Fig. 3.

When the lever is in this position the member (B) drives the ring by the lever at the point (x). This causes the lever (E) to expand the ring (D) within the cup of the member (A) with such force that the friction caused on the surface of the ring exceeds the force on the lever; therefore, the greater the load the tighter the grip.

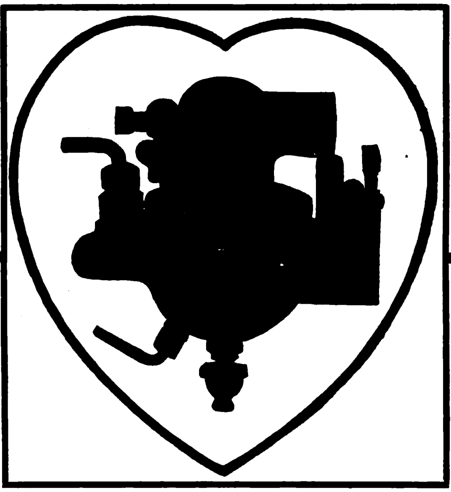


The "Automatic" Clutch, Fig. 4.

This clutch is always self-adjusting, being designed to take up wear until the expansion ring is completely worn out. The clutch being engaged against the load, is under absolute control of the operator. When it is disengaged the members are completely released and operate independently of each other, thus eliminating friction and wear when the clutch is out of engagement while the engine is still running. As it contains no toggle joints, bolts or screws, there is nothing to work loose and cause damage.

Such is the demand for Timken axles and roller bearings that, in addition to their recently much enlarged plant, the Timken Roller Bearing Axle Co., Canton, Ohio, have just contracted for buildings and machinery that will more than double their present capacity. The new buildings, like their present plant, will be equipped with the automatic sprinkling system, thus insuring absolute safety to customers' work entrusted to them. They have also secured the services of H. W. Alden, formerly with the Pope Mfg. Co. and the Electric Vehicle Co.

THE HEART OF THE AUTOMOBILE



The Schebler Carbureter

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¶ 1,094 3-16 miles in twenty-four hours continuous running on a circular track; 1,000 miles in 21:58:00 4-5 continuous running on a circular track, breaking all world's records by 1:35:19 1-5.

¶ This is the world's record travels of a National car fitted with a SCHEBLER carbureter at the Indianapolis Fair Ground Tracks, Nov. 16th and 17th. Hundreds of miles were reeled off with scarcely a variation of a second in the time ot each.

¶ Is it any wonder that eighty-three of the largest marine and automobile engine builders in the United States and Canada are equipping their motors with the SCHEBLER?

¶ A carbureter that gives a perfect mixture at all engine speeds regardless of weather conditions is truly "The Heart of the Automobile."

WHEELER & SCHEBLER, Manufacturers Indianapolis, Ind., U. S. A.

P. J. DASEY, 431 Wabash Ave., Chicago, Ill., Factory Representative

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JOS. BRASSARD, Central Falls, R. I.
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C. J. SMITH & COMPANY, 354 St. Peters Street, St. Paul, Minnesota.
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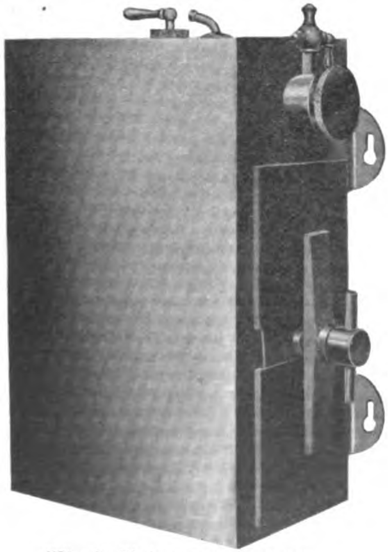
TURNBULL & JONES, Dunedin, N. Z.
GEO. NEILL & CO., 38 Fenchurch St., London, England

Standard Carriage Lamp Company's 1906 Additions

The Standard Carriage Lamp Co., 43-49 South Canal St., Chicago, Ill., have brought out for 1906 a new head light, side light and generator, shown and described herewith.

The "Solvictor" headlight.

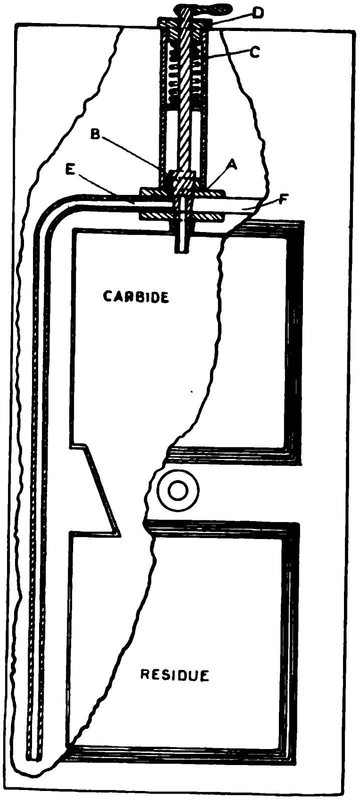
The new headlight is called the "Solvictor," and is made in two sizes. A new lamp feature is involved in the construction of this headlight, comprising a removable condenser lens, and the method used in attaching the same. The condenser lens can be removed for cleaning, and the user can utilize the diffusion of light in wide range directly in front of the car when it is more desirable than projecting the rays far in advance. The hinges have slotted sliding pins, and are unusually strong and heavy. This lamp is made only for use with independent generator.



"Standard" Automatic Generator.

The two sizes are known as No. 5 and No. 6. The former is 11½ high, 10¾ long, and lists at $30, while the latter is 13 high, 11 long, and lists at $36. The No. 5 weighs 11 lbs., and the diameter of the flanges is 10 ins. It consumes ¾ ft. of gas per hour. The No. 6 headlight has a 1-ft. burner tip, is 12 ins. across the flange and weighs 12 lbs.

The square brass side lamp, made in two sizes, is designed for limousine bodies and fine automobiles, perfectly harmonizing with the graceful lines of the same. The oil font contains a positive locking device, and the wick cannot be jarred down, being manipulated up and down by a worm gear. A 2-in. red jewel in the rear or door displays the usual danger signal. The combination prop fastening is such that it can be used with either round or flat brackets. The two sizes, No. 6 and No. 7, list at $30 and $39 per pair, respectively, with plain glass, or $36 and $45 with swell glass. No. 6 is 14 ins. high, burns 20 hours on one filling of kerosene. It is fitted with glasses 5¼x4⅝ ins. No. 7 is 15 ins. high, burns 24 hours on one filling, and is fitted with 5⅝x5¼ in. glasses.



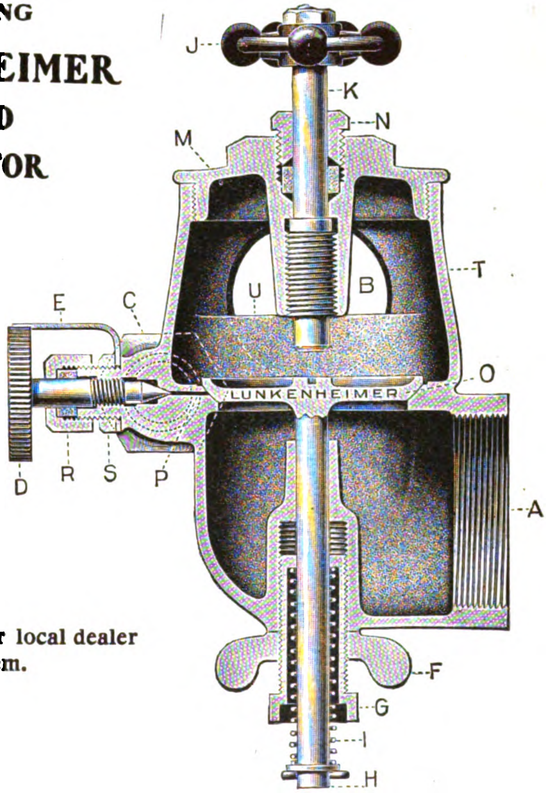
Sectional view of the "Standard" automatic generator.

The Standard automatic generator, shown herewith, is made in one size, No. 4, which is 14 ins. high, 10½ long, 5½ deep, and it fitted with a 1-ft. tip. It is simple in operation, the laws of gravity and pressure being utilized to produce automatic results, no matter how many lights are in use, and the amount of water supplied to the distributer of the carbide holder automatically adjusts itself in accordance with the amount of gas used. The method of operation comprises a water feed

The Greatest Efficiency

IS OBTAINED FROM ANY MAKE OF GAS ENGINE
BY USING

LUNKENHEIMER
IMPROVED
GENERATOR
VALVES



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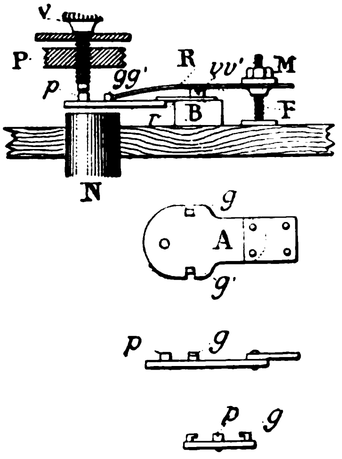
1 A. T. J.

tube on each side of the carbide receptacle and extending down into the water reservoir, up through which the water flows to the water feed valve. The water then discharges itself from the bottom of the valve plug directly through the distributer onto the carbide. This instantly generates gas, and as soon as the pressure rises to a predetermined point it reacts at once upon the relatively low pressure of water at the outlet opening of the valve, forcing the water back and down the feed tubes to a point where the pressure of gas, and that caused by the head of water, is equalized, and no more water can then flow upward through the tubes until the pressure of gas has been reduced. Thus the gas pressure is both formed and decreased gradually, and is always under control. This generator will operate 17½ hours on one charge of carbide, and lists at $30.

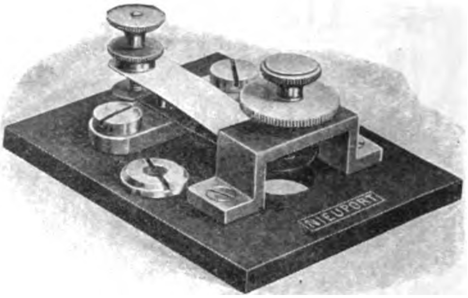
The Niuport Vibrator

The magneto vibrators, which were used years used on slow stationary gas engines before the coming of the gasoline engine, were neither quick nor regular enough for the proper ignition of engines turning three or four times as fast as stationary engines. Many improved types of vibrators produced thin, weakly sparks, which were lacking in intensity, and also oscillated too fast. To overcome these defects the Albert Champion Co., 541 Tremont street, Boston, Mass., are marketing the "Niuport" vibrator.



Sectional View "Niuport" Vibrator. (A) Soft iron plate to which is rivetted platinum contact (P). (VV') Screws on metallic post (B). (P) Iron bridge on which is platinum screw (V). (R) Flat spring sliding in small hooks (gg'), resting on screw heads (vv') (M) Screw and lock nut holding one end of (R) on rod (F).

Referring to the sectional cut the moving parts of the "Niuport" vibrator comprise a flat soft iron plate (A), guitar shape, 1-32 in. thick, the wide end of which is placed right above the core of the coil and is ¾ of an inch in diameter and wider than the core to facilitate its magnetisms. On it is riveted a platinum contact P, on each side of which are two little hooks (gg'). The other end of this iron plate.is riveted to a small flat spring that is held by two small screws (vv') on metallic post (B), connected to the coil above the core (N). The soft iron bridge (P), placed there to intensify the magnetic action of the core on the plate (A), is connected to the primary coil. On this bridge (P) is a platinum screw (V) with a lock nut. One end of the flat spring (R) slides in the small hooks (gg'), resting on the screw heads (vv') and the other end is held on rod (F) by screw and lock nut (M). The screw and lock nut give the necessary tension to the spring and allow the iron plate (r) to follow the variations of the inducted fluid in the core and close and open the circuit as it comes in contact with the platinum screw (V) or is drawn by the magnetic plant of the core.



Top View of the "Niuport" Vibrator.

The tension of the flat spring that makes the contact on the platinum screw and limits the intensity of the current at the breaking of the circuit, is adjustable, so that this vibrator can be put on all coils and electric stations with a tension of from 2 to 12 volts.

This regulation of the spring needs no great precision, as the vibrator can vibrate with a very weak spring, or with the spring highly strung.

However badly regulated, the vibrator always works and will never stick. Never can the two platinum contacts become soldered together.

The platinum screw is not used for regulation, as in other vibrators. Its aim is simply to bring the soft iron flat spring as near as possible to the core, so as to benefit by the full intensity of the magnetic attraction.

The top leather manufactured by the Boston Artificial Leather Co., of Stamford, Conn., comprises strong and well wearing 54-inch Morocoline on a tan duck back and their standard grade of Morocco-line leather, 50 inches wide, on a sateen backing, both of which are used extensively by the largest makers of tops in the country. Their lighter material, 50 inch twill, is even more flexible than the sateen backing and yet has the same degree of strength. These leathers are made in various grains and colors.

The Maxwell-Briscoe Motor Co., Tarrytown, New York, call attention to the fact that their model H car won the Los Angeles-San Diego Endurance Contest, as was announced by the judges, but was disqualified later because of having the word Maxwell on the plate with the official number. They were, however, awarded a gold medal for excellent performance of the car, and a silver medal for the driver.

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We have ample facilities to meet required deliveries, and would be pleased to have you call at either of our plants or write for further particulars.

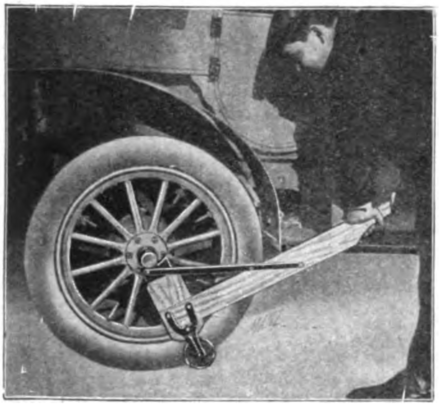
The Allyne Brass Foundry Co.

Cleveland and Detroit.

Largest Producers of Aluminum Castings in the United States.

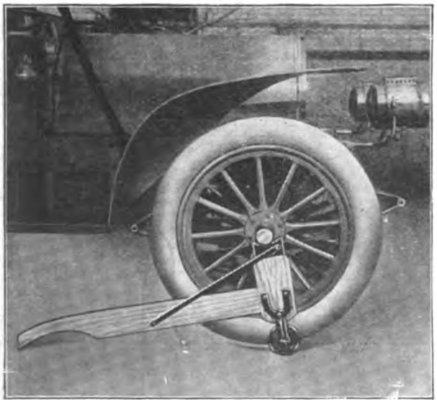
The "Murray" Automatic Jacks

The "Murray" Automatic Jacks, manufactured by The Bicycle Step Ladder Co., Chicago, Ill., afford a simple and inexpensive method of lifting a car off the floor when stored in a garage or for other reasons. This jack is made of wood in the form of a T. The curved end of the short cross bar is placed partly under the wheel hub and by a downward movement of the longer bar or handle, the wheel on the other end of the short cross bar is forced under the automobile wheel, thus raising the car wheel from the ground. It is pushed under, however, until the handle end rests on the floor.



Lifting Rear Wheel with the "Murray" Automatic Jack.

The curved end on which the wheel hub rests being made of wood will not mar the hub. It is strengthened by means of an iron bar extending from this end to the handle bar.



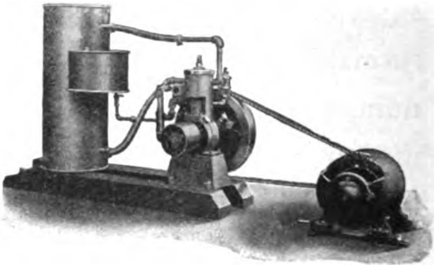
Position of the "Murray" Automatic Jack when Car is off the floor.

A man with four of these jacks can lift a car of any weight in fifteen seconds.

These jacks are made in two styles, semi-adjustable for private use and adjustable for public use. Regular sizes are for tires 28, 30, 32, 34 and 36 inches in diameter. The list prices are $7.50 for the semi-adjustable set of four jacks and $10.00 for four adjustable jacks.

Wonder Charging Plant

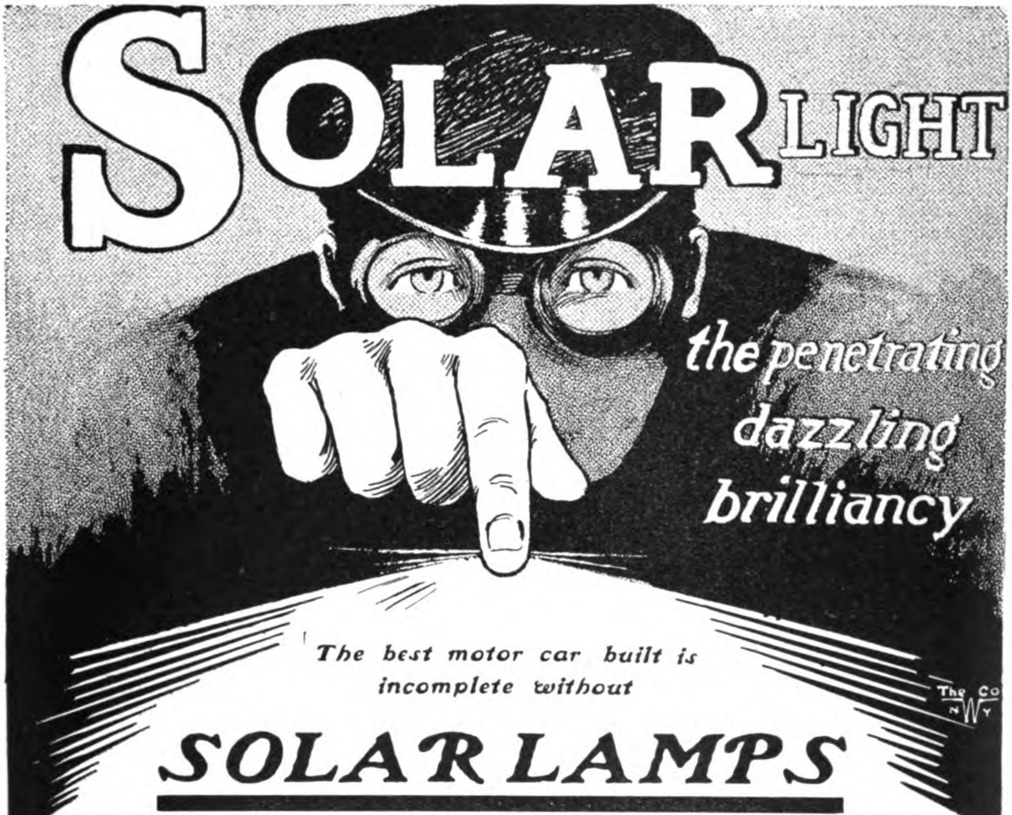
The R. M. Cornwell Motor Co., of Syracuse, N. Y., are putting out a compact and efficient charging outfit for public and private garage use. These outfits are furnished in a large number of sizes to meet various requirements ranging in capacity from 6 to 50 amperes. The outfit is belt connected and parties already having power for the purpose can purchase the outfit minus the engine, etc. The dynamo used has base dimensions of 13½ by 8 inches and is 8½ inches high. It weighs 64 pounds and runs at a speed of 2300 R. P. M. A ½ to ¾ H. P. motor is used to operate the dynamo. Brush holders are of the well-known box type supported on cast iron rock arms. The magneto coils are form-wound, carefully insulated and varnished, and are strong mechanically. The armatures are of the slotted drum type. The construction of the commutator differs from the usual practice, being made of a large number of segments of hard drawn copper. These segments are carefully insulated with best selected mica. The commutator has a large outside diameter insuring long life. A large diameter shaft is used and runs on bronze bearings provided with ring oilers. The oil chambers are of large size and are of sufficient capacity to run the dynamo for one month without refilling. The meters furnished with these outfits are made with either front or back connections and are fully guaranteed. The well-known "Wonder" gasoline engines are furnished to operate these outfits where the purchaser has no power already installed.



Wonder Charging Plant.

Ex-President Elliot C. Lee, of the American Automobile Association, is now the president of the Shawmut Motor Co., Stoneham, Mass.

In addition to cotton cloth and rubber cloth covers used for protecting automobiles when shipping or in garages, the Landers Brothers Co., Toledo, O., also manufacture buckram for stiffening and backing around cushions and seats, black oiled duck for drip aprons and tops, khaki duck and mackintosh cloths for tops and linen scrim and rattan moulding for body makers. For upholstering they manufacture nails, buttons, enamel oil cloth, wadding, cotton batts, seaming cord, webbing, cotton duck and cotton sheeting.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The best motor car built is incomplete without
SOLAR LAMPS

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It has a water jacket that cools the gas.

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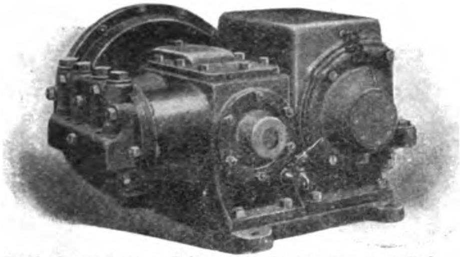
Wisconsin

11 Warren St.,
NEW YORK CITY

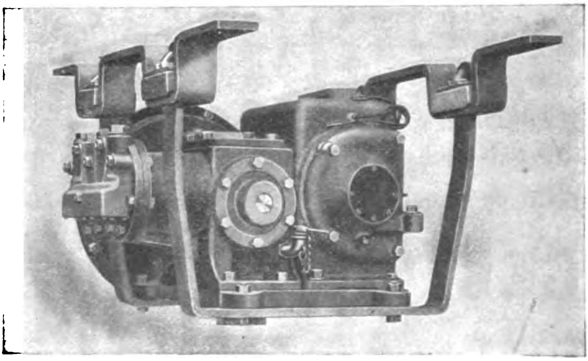
Westinghouse Air Compressors for Garage Vse

Westinghouse Air Brake Co., Pittsburg, Pa., who are so well known as manufacturers of air brake pumps for railway and similar use have lately adapted this type of compressor to garage use. These compressors are made for steam or electric drive and the fact that they are designed and built for the important purpose of supplying the air brake systems on steam and electric railroads throughout the world, and that after years of trial and practical operation the railroad companies find them well adapted for such purpose, is an indication of their absolute reliability.



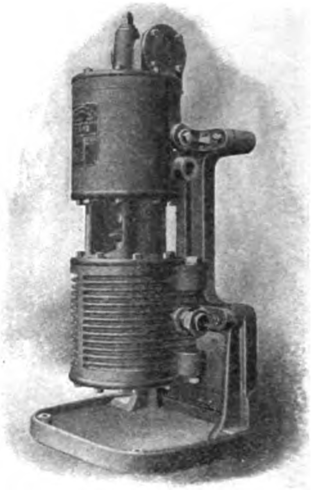
Westinghouse Motor Driven Air Compressor Installed on floor.

One of the cuts herewith illustrates their motor driven air compressor designed for use with direct current of 110, 220, or 600 volts. A four-poled railway-type series motor is mounted on a cast iron bed plate with a duplex, horizontal, single-acting compressor, and connected to it by herring-bone gear and pinion. The motor frame is made of steel with cast iron bearing heads on each end, the whole forming a dust and rain-proof case, in which all of the motor parts are contained. Oil wells and rings furnish ample lubrication for the motor bearings, while it is impossible for the oil to work into the motor chamber. The commutator and brushes are easily accessible through a small door in the front of the frame and the leads pass through suitably insulated holes in the field casting. For indoor use, a ventilated type of motor may be supplied, on which the commutator door is grilled, and latticed covers are inserted in the frame opposite and above the door, and in the bearing heads over the bearings, thus giving ample circulation of air.



Westinghouse Motor Driven Air Compressor mounted on cradle for use where floor space is not available.

The compressor crank case and cylinders are cast in one piece, while the cylinder head covering both cylinders is also one piece. The pistons are of the trunk type, fastened to the connecting rods by a pin through the piston body. The steel crank shaft has the cranks at 180 degrees and its centre line is a little below that of the cylinders, so that during the compression stroke, the connecting rod is nearly horizontal during the entire stroke. The inlet and outlet valves are in the cylinder head, placed in such a way that they are each accessible separately. They are made of steel tubing. The two inlet valves are towards the outside of the cylinders, and the discharge valves are towards the centre. Air is drawn in through a screen in the bottom of the square projection on the cylinder head, and is discharged to the piping system through a hole in the top and centre of the head. When the compressor is designed for indoor use, the top cover usually employed has a pipe-tapped opening which can be connected by piping to the outside atmosphere, in case any vapor escaping might be unpleasant, or harmful to surrounding objects. Splash lubrication is employed.

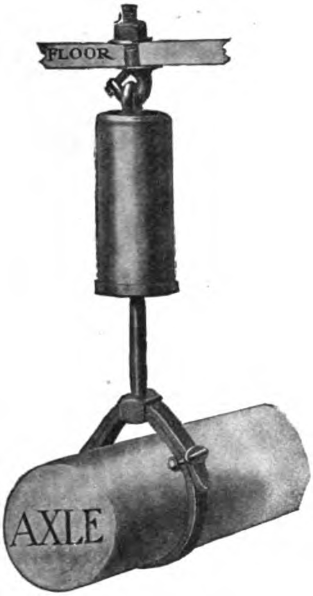


Westinghouse Steam Driven Air Compressor and Air-Storage Reservoir Combined.

The large gear wheel is made in halves firmly bolted together, and keyed onto the end of the crank shaft. The motor pinion with

Baldwin Recoil Check

Makes the Rough Places Smooth



The Baldwin Check is an automatic frictional device which perfectly controls the recoil of the springs, increasing the comfort and pleasure of automobiling thereby.

It is so constructed that it permits the free action of the springs over smooth roads, but steadies the movement of the car over rough places. It will save you many dollars in broken springs and wear and tear on tires.

It can be easily attached to the body and axle of any make of car. On account of its flexibility it cannot be strained or broken by any oscillating or lateral movement of the car or running gear. No oiling or adjusting is required, after it is once attached to your car.

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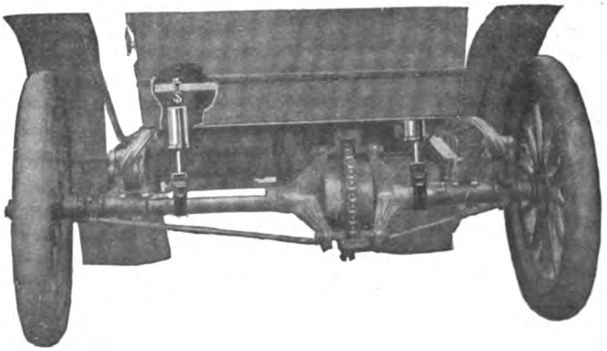
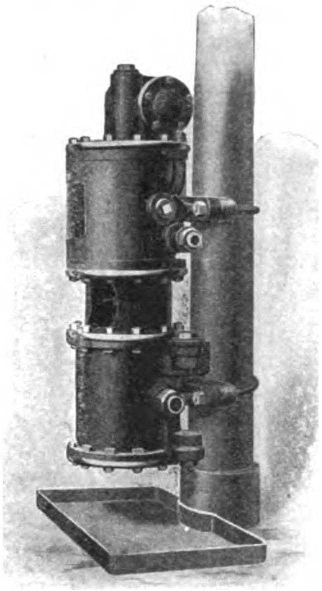
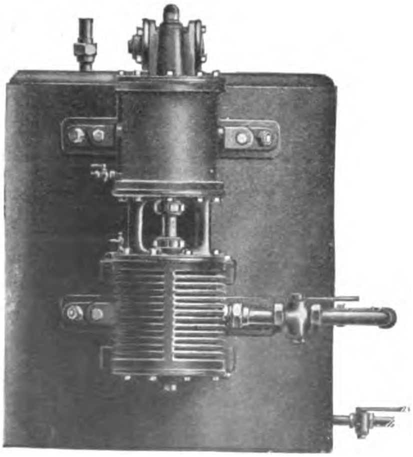


which it engages is also made in two parts firmly joined together and with a specially machined flange which connects a lock nut on the end of the motor shaft in such a way that by unscrewing the nut the pinion is forced off the shaft.

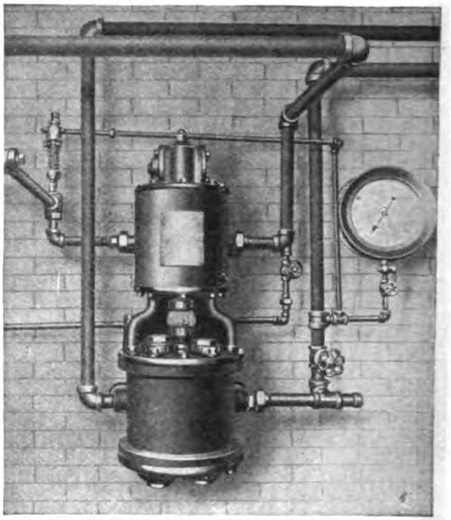


Westinghouse steam driven air compressor mounted on column.

These compressors are built in four sizes, delivering 10, 20, 32, and 46 cubic feet of free air per minute. They are built with either plain or water-jacketed air cylinders, the latter for cases that require continuous operation, while the former are not supposed to operate more than 50 per cent. of the time, thirty minutes being the maximum single operation, followed by the same period of rest. The motors are built also for single and poly-phase currents, of the ordinary voltages and alternations.



Westinghouse Steam Driven Air Compressor mounted on cast iron stand for use where a wall, column or other support is lacking.



Westinghouse Steam Driven Air Compressor mounted on wall. This one has a larger air than steam cylinder, as low pressure was required for the work to be done.

We also show a Westinghouse steam driven air compressor which is so well known as to hardly require description. They consist, primarily, of steam and air cylinders placed vertically in tandem, joined by a short centre piece, and covered, top and bottom, with suitable cylinder heads. The steam and air pistons are connected to the same piston rod, and the valve motion is all contained in the top cylinder head. This valve motion is operated by steam, which is controlled by means of a rod connected to the valve gear and extending into a hollow part of the piston rod in such a way that, when the steam piston reaches the limits of its stroke, the rod above mentioned is forced to slightly change its position. This movement governs the flow of steam to the valve motion so as to give the proper steam distribution in the steam cylinder.

The air valves are of the ordinary check valve type, are made of steel, and require very little lift, thus insuring long life. The inlet valves are on one side of the air cylinder and the discharge valves on the other. All four are of the same size and pattern. The steam end is lubricated by an ordinary steam engine lubricator, placed in the steam piping, while the air cylinder receives its lubrication from an automatic air cylinder oil cup placed in the centre piece on the left side.

These pumps are built in several sizes, and a large number of combinations can be made in placing different sized air cylinders with the standard steam cylinders, thus giving a wide range of air pressures for any given steam pressure.

Both the motor and steam-driven compressors may be supplied with automatic governors which can be set for any ordinary pressure, and automatically control the pump with the utmost accuracy, so that after once started they require no attendant to watch over them and thereby no increase in the ordinary working staff employed in the garage.

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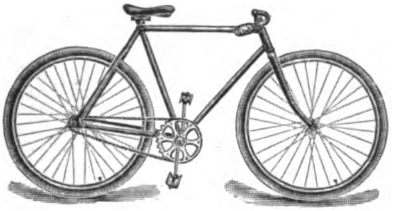

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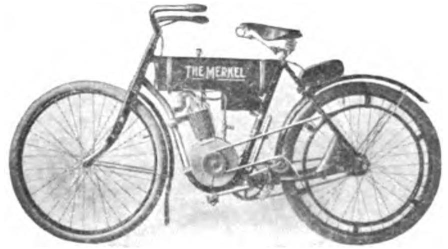

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We want to quote you prices. WHY NOT LET US?

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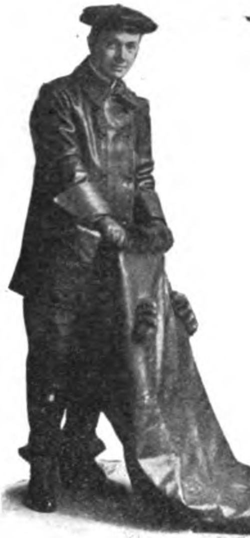
42 and 44 Cortlandt St., - New York City.

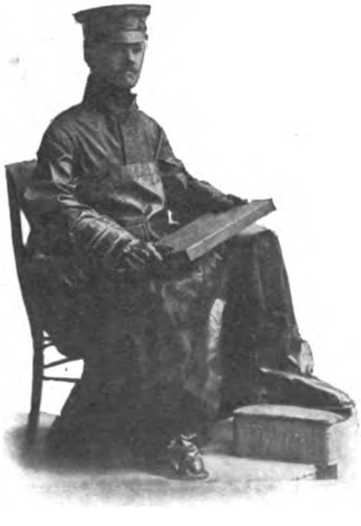
New "Scandinavian" Lap Robes Steering Aprons and Pongee Hoods

The 1906 line of automobile apparel, made by the Scandinavian Fur and Leather Co., 14-16 West 33d street, New York, includes the new lap robe, steering apron and hood illustrated herewith.



Scandinavian leather top robe with muffs.

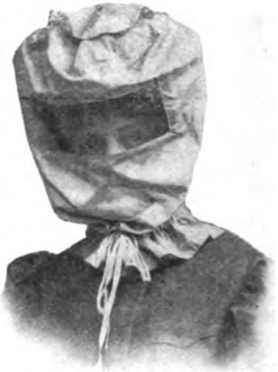
The lap robes made of Scandinavian leather are designed to give solid comfort in cold weather. At the top are two side pockets, which form a muff for the hands. They clasp down the sides so as to be easily slipped into. The list prices range according to the lining, fur being $45, black dog $55, and raccoon $90. A woolen lining is also used at a lower price than the fur.



Scandinavian steering apron.

The steering apron allows unimpeded use of the levers and is made with rubber soles in oil cloth for $20, Scandinavian black leather $35, and Scandinavian tan leather $42.50.

The pongee hood with mica window can be slipped on over the hat, fastening around the neck by pull strings, and lists at $3.50. A large size of very light weight and without the mica window lists at $5.50. Another style that buttons around the cap and has a mica window, giving a wide range of vision, lists at $5.



Scandinavian pongee hood with mica window, adapted to go over hat.

Alco Tire Talc

American Lava and Talc Co., Chattanooga, Tenn., well known to the trade as manufacturers of lava burner tips and lava spark plug cores, are also makers of pulverized talc for use on inner tubes to prevent chafing and injurious friction between the tube and shoe. "Alco" tire talc is put up in quarter pound tin boxes fitted with a sifter top. These cans, are of convenient size and proportions, for use among the garage or for placing in tne kit. The manufacturers quote very low prices to the trade.

As an incentive to motorists to familiarize themselves with the methods of handling tires which are best suited to preserve them and thus save at least 35 per cent. of an automobile up keep, the Pennsylvania Rubber Co., Jeannette, Pa., offers nine prizes, amounting to $1000 in cash, for a tire economy competition to be used during 1906. The prizes will be awarded to the owners or chauffeurs of cars using Pennsylvania clincher tires which finish the year, 1906, with the least tire-expense per running mile. Each car entered must travel 2500 miles or more during the year.

Solid wood seat back bending has so developed as to become a distinctive and separate business by itself. These panels are now being produced by Tucker Woodwork Co., of Sydney, Ohio, with flare and cone corners already incorporated, thus precluding the necessity of altering, splicing and building up to effect a fit at the seat frame and making such a saving in time and labor as to permit their use economically in all round corner seats, which for years it has been necessary to build up with staves or pillars.

THE MOTOR CAR EQUIPMENT CO.

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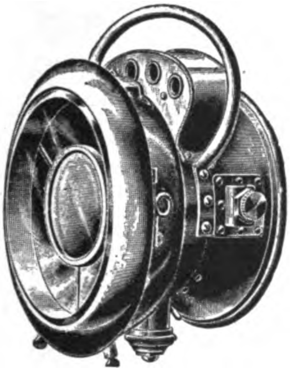

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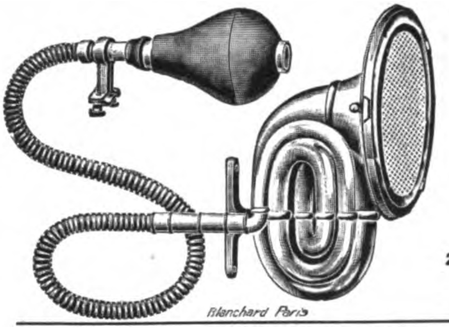
"The World's Best"

THE GENUINE "BLANCHARD"



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Like
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The New French "SIREN"

Sounds
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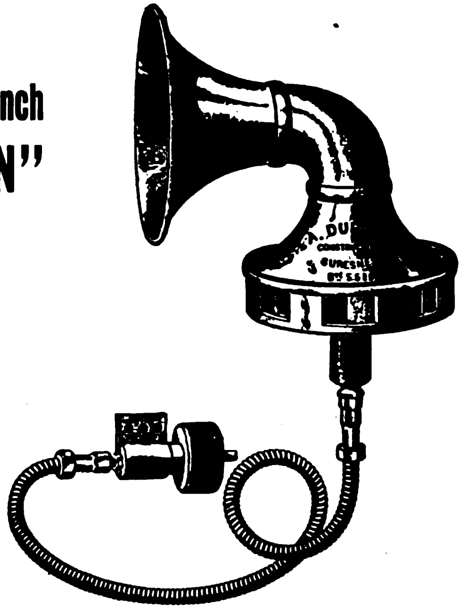
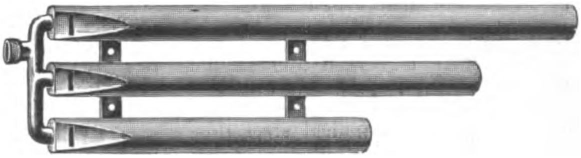


The Continental Calliope

The Most Musical of its Type

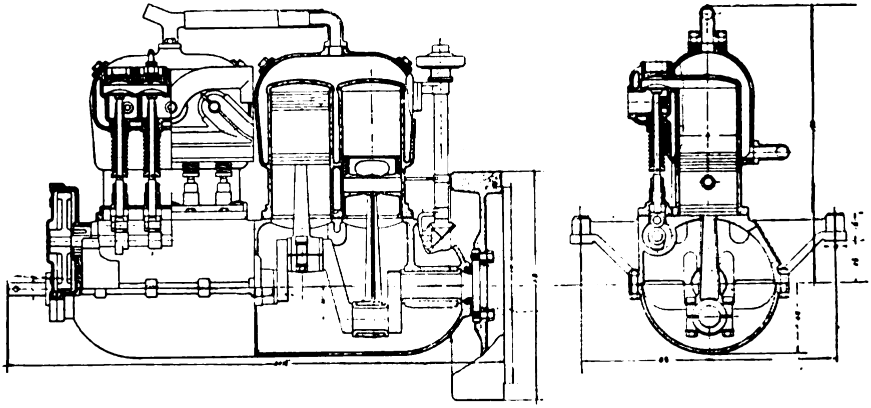
Sounds like an Organ



55 WARREN STREET - **NEW YORK** - 1645-47 BROADWAY

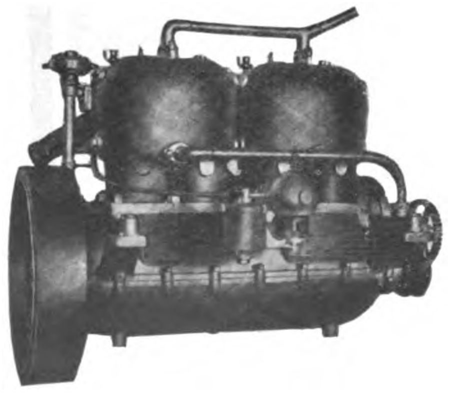
Merkel Form P 4-Cylinder Automobile Motor

Merkel Motor Co., Layton Park, Milwaukee, Wis., have just placed on the market a new 4-cylinder automobile engine known as their Form "P." This motor has a bore of 4 in. and a stroke of 4½ in., developing 20 to 24 horse power on the brake. It is 17½ in. in width over supports and 34 in. in length over all. The flywheel is 15¾x3½ in. and makes from 150 to 1500 revolutions per minute. The engine complete weighs 340 pounds.



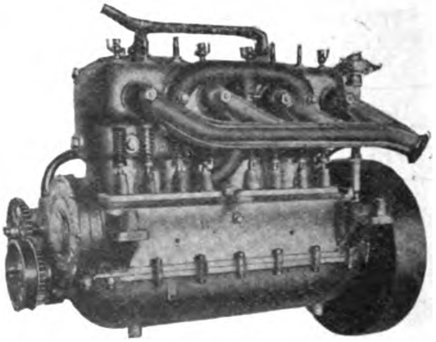
Sectional View New Merkel Form P 4-Cylinder Automobile Motor; bore 4 in., stroke 4½ in., weight complete 340 lbs., develops 20-24 B. H. P.

The crank case is of an aluminum alloy, 95 per cent. pure, 5 per cent. nickel steel. It is split horizontally, the upper half carrying all the crank shaft bearings and the four supports. A hammer forged, 30 point carbon steel crank shaft is used, cranks set at 180 degrees. It is finished throughout and each bearing surface is turned and ground to exact size. The connecting rods are steel drop forgings, having lower bearings bushed with Phoenix metal. Mechanical steel tube piston pins, hardened and ground, are expanded in the upper ends of the connecting rods. The cylinders are cast in pairs with heads, valve ports, etc., integral. Each piston carries two pairs of rings, which are all ground on three faces. The pistons are provided with oil grooves.



Carburetor Side New Merkel Form P Motor.

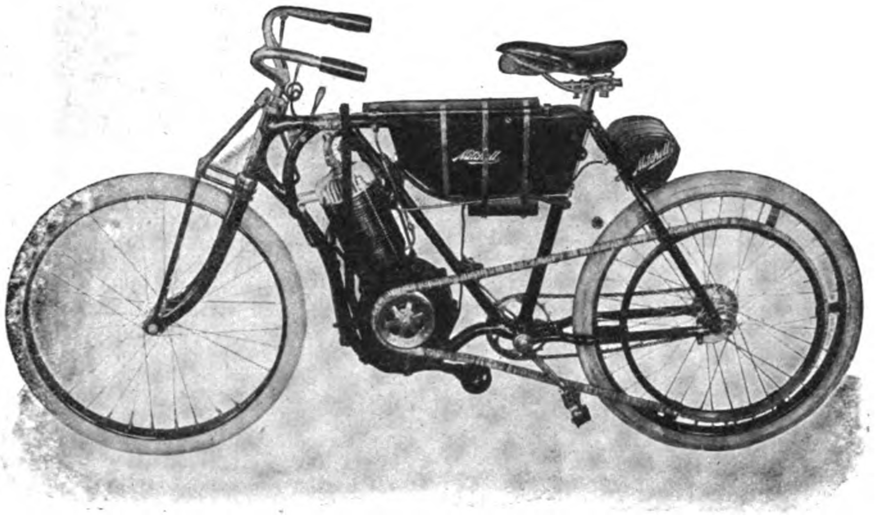
Inlet and exhaust valves are on the same side of the engine, but the carburetor is placed on the oposite side, a pipe passing from it between the two pairs of cylinders and thence to the valve chambers. All valves are mechanically operated. They are independently removed and are interchangeable. Only one scondary shaft is used, and this is enclosed within the crank case. A part of the exhaust is shunted so as to pass through the carburetor body to keep it warm and aid vaporization. Ignition is by jump spark and the plugs are furnished with each engine. A Lacoste timer is mounted on a vertical shaft operated by mitre gears from the secondary shaft. Circulation is maintained by a gear pump direct driven by bronze gears. Upper and lower water connections are furnished complete and assembled. The flywheel is designed for either conical or disk clutch and can also be used with couplings for planetary type of transmission.



Valve Side New Merkel Form P Motor.

Chas. E. Miller, the well known jobber, of 97 Reade St., New York, advises us that his new branch retail store, 924 Eighth Ave., New York City, is now open and ready for business. This new store is very commodious, and is within 200 feet of the new club house of the Automobile Club of America. The new branch stores which we mentioned some time ago in these columns, the one at 227½-229 Jefferson Ave., Detroit, and the other at 824 Main St., Buffalo, are also now ready for business. Mr. Miller now has six branch stores in operation in addition to his main headquarters on Reade St.

Mitchell



PRICE, $175.00

Dealers are bound to increase their profits if they handle the **Mitchell Motor Cycle.** It has gained the well-deserved reputation of being one of the most carefully constructed motorcycles on the market. You are therefore assured of satisfied customers, and you know what this means.

Write at once for agency terms.

MITCHELL MOTOR CAR CO.

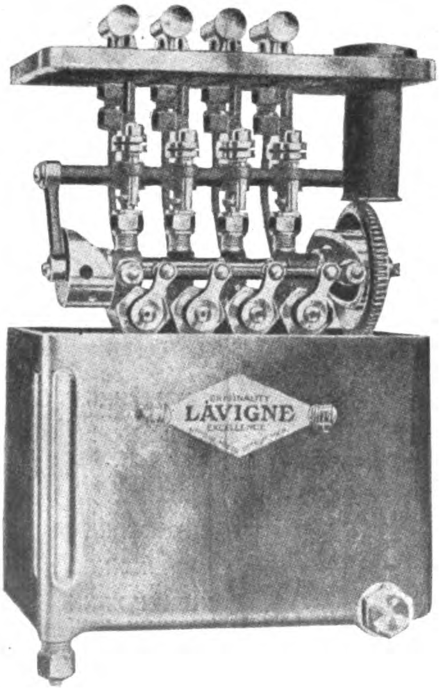
Racine, Wis.

Members American Motor Car Manufacturers Association.

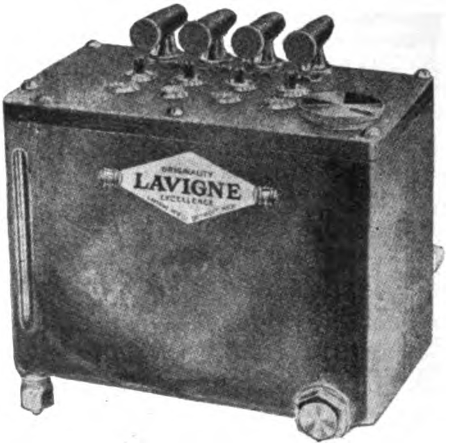
The Lavigne Oiler

Chas. E. Miller, 97-101 Reade St., New York City, is sole selling agent for The Lavigne Oiler, manufactured by The Lavigne Mfg. Co., Detroit, Mich. This oiler will deliver the oil against a pressure of 2500 lbs. to the square inch and keeps the oil pipes free from obstructions. It is devoid of springs and check valves and works very easily. The four-feed size can be operated by a common linen thread belt, it is claimed.

The operator is enabled to accurately calculate how much oil shall be delivered to each cylinder of bearing. He can also estimate in advance how much oil will be needed in traveling a definite distance. Oil is only fed when the engine is running and then the flow is in accordance with the speed. There is a continuous column of oil from the pump to each point to be lubricated; hence each stroke of the pump, by drawing in a quantity of oil at that end, discharges a similar quantity of oil to the bearing or cylinder at the other end. As friction is greatest at the beginning of the motion, this last feature is a very important one. Each feed can be independently regulated and the quantity of oil to be delivered at each stroke of the pump can be increased or diminished intelligently. The markings on the dials enable the operator to vary the capacity of each stroke of each plunger to the .0001 of a cubic inch.



The rate of oil flow is varied by micrometer adjustment. The upper end of each plunger is squared to receive an indexing intermitting gear which is fastened to the cover. The upper part is graduated to 20, while the lower part has two teeth which engage with the driven intermittent gear, which in turn is connected with the main dial on the cover. This main dial is graduated from 0 to 10. Hence each complete turn of the plunger will move the main dial two divisions. The maximum stroke of the pump is 5-16 inches, and as the threads on the plungers are 16 to the inch, it will be seen that five complete turns of the plunger will reduce the capacity of the stroke from the maximum amount to nothing. Thus this arrangement of dials registers the capacity of each stroke in ten equal divisions, and these latter are further registered in ten subdivisions.



The plungers used in the Lavigne pump are ¼ inch in diameter and the length of the maximum stroke is 5-16 inches.

The Lavigne pump is geared to 64 revolutions of the worm shaft to one complete stroke of the plungers. Hence, if the worm shaft be driven at 500 revolutions per minute, the plungers would make practically 8 strokes per minute.

The list prices range from $2 for the No. 1 size, which has 1 feed and holds 4 pints, to $49 for the No. 28 size, which has ten feeds and holds 10 pints of oil.

Jolley's Copper Tanks, Tubing, Rivets, Etc.

Jolley Brass and Copper Co., 42 N. Fifth St., Philadelphia, Pa., manufacture an endless variety of copper and brass tubing in round, square, hexagonal, rope and reeded forms. Both seamless and bronzed tubing are carried in sizes from 3-64 inch to 38 inches, and although the automobile trade calls for a wide variety of shapes and sizes they are able to meet all requirements of this trade.

They also make seamless copper automobile tanks shells and mufflers. They make, also, almost all the rivets used in this country in the manufacture of lamps. A large stock of these rivets is constantly kept on hand and deliveries in any needed quantities can be made immediately.

They also carry in stock brazing compounds, spelters, soldering irons, solders in grain, wire and bar iron, sheet brass for lamps, step plates and other trimmings.

Licensed Acetylene BURNERS

Made of One Solid Piece of Lava.
No metal arms.
Once in alignment—always in alignment.

MANUFACTURED UNDER LICENSE

(U. S. Patent No. 589,342, Aug. 31, 1897.)

THE IMPORTED VON SCHWARZ

J.V.S.
PERFECTION
SCHWARZ
PAT'D AUG.31-97
APR.26-98
DEC.27-99
MK&CO.

PERFECTION

J.V.S.
CORONA
VON SHWAR
AUG.31
APR.26
DEC.27
K&CO.

CORONA

J.V.S.
J.V.S.
PATENTED

AUTO

In a Class by Themselves.

Standard of Merit, wherever Acetylene is Known

They are a trifle higher than all other burners, but they must be worth it, as they

are used by every reputable Auto Lamp Maker

Imitated, but NOT Equaled

50c. per piece $4.00 per dozen

For Sale by all Auto Lamp Makers, and all Dealers

Take no substitute.

"J.V.S." on Steatite; and "J. V. S." and "M.K.& Co." on pillar.

M. Kirchberger & Co.

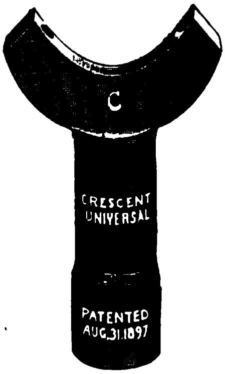
Sole Importers and General Licensees.

50 Warren Street, New York

THE DOMESTIC CRESCENT

C
CRESCENT
NEW
YANKEE
PATENTED
AUG.31.1897

NEW YANKEE


C
CRESCENT
UNIVERSAL
PATENTED
AUG.31.1897

UNIVERSAL

C
PAT.AUG.31
1897

VICTORY

The Cheapest Licensed Burners.

Crescent Burners can be found in House and Town installations, and in all those Auto Lamps which do not carry Von Schwarz's, carry the Crescent's.
They have been on the market for years, and say

Try Me
if you do not know me.

Light, Durability, Accuracy
We guarantee every burner

25c per piece. $3.00 per dozen.

For Sale at all Dealers.

"C" on Steatite. "Crescent" on pillar.
Beware of Imitating Infringers.

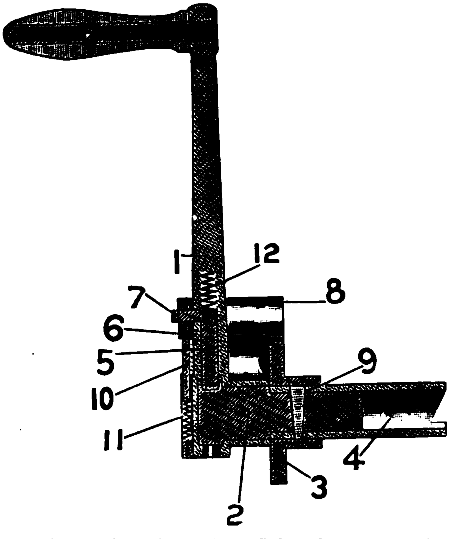
Crescent Burner Mfg. Co.

Factory: Chattanooga.
OFFICE: 50 Warren St., New York

Automatic Cut-Out for the Tiley-Pratt Tire Pump

The Tiley-Pratt Co., Essex, Conn., are now marketing an automatic cut-out for their tire inflating pump, which will disengage the pump at any desired pressure. This device is not essential, but is a very desirable adjunct to their tire pump outfit, as it obviates any possibility of over-inflation.

To install this cut-out a T is placed at a convenient point in the main air pipe leading to the pressure gauge on the dash, and from this T a branch pipe is led horizontally through the dash. An upward bent trap is made in this horizontal pipe and on the open end of the pipe on the dash is placed a cylinder in which five to ten drops of heavy oil is placed and which is fitted with a plunger. The trap is to prevent the oil from getting into the main air pipe. A shipper rod bearing on the plunger stem leads through the dash to the pump-operating mechanism. When the pressure in the main air pipe has reached the predetermined point, the same pressure will, of course, obtain in the branch, and will force the plunger in the cylinder to rise and this operates the shipper rod, which stops the pump.



Sectional View of the Auto Safety Starting Crank; numbering explained in the reading matter.

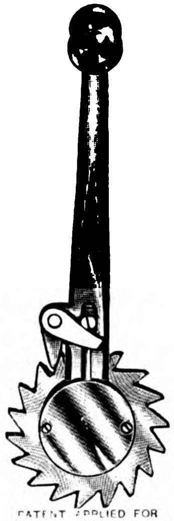
The Auto Safety Starting Crank

The Auto Safety Starting Crank Works, 170 South Clinton street, Chicago, Ill., are putting on the market an absolutely safe starting crank which is so constructed as to prevent any back kick of the handle which sometimes results in serious injury to the operator. This device is made in either bronze or steel.

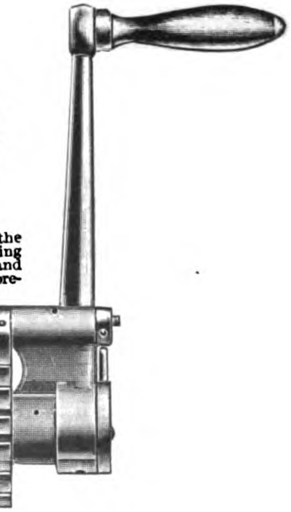
Referring to the sectional view of the starting device herewith, 1, is the steel or bronze crank; 2, the outer end of a long sleeve that fits over the crank shaft, as the ordinary crank, and is milled out in equidistant slots to receive a sliding pin; 3, stationary ratchet that is attached to the frame of the automobile; 4, steel sleeve that can be made to fit any crank shaft; 5, sliding pin that holds No. 2 on the forward motion; 6, small lever for raising pin; 7, screw that connects 5 and 6; 8, pawl which engages the fixed ratchet wheel in such a manner that any back pressure results in automatically withdrawing the sliding pin from slots in No. 2, leaving crank shaft free to revolve; 9, taper pin that connects Nos. 2 and 4; 10, and 11, small pin and spring that hold No. 6 in position; 12, spring to hold sliding pin in position.

These cranks are made in three styles, No. 1, steel crank, finished in black; No. 2, steel crank, finished in brass or nickel, and No. 3, all bronze, highly finished and listing at $14. Nos. 1 and 2 list at $10 and $12, respectively.

When ordering the crank the description of the old crank, with size of crank shaft and distance from the crank shaft to the outside of the auto frame should be given.



Front View of the Auto Safety Starting Crank, showing pawl and ratchet wheel which prevent back kick.



Exterior Side View of the Auto Safety Starting Crank.

The Snutsel Auto Supply Company, recently incorporated with Paul L. Snutsel as president and general manager; Joseph C. Hoffman, vice-president, and Rudolph Weinacht, secretary and treasurer, has opened offices and salesrooms at 1534 Broadway, New York City, for the purpose of wholesaling and retailing, manufacturing, and importing and exporting auto supplies and accessories. The company controls the American rights for a number of noteworthy European patents.

No-Ko-Rode

THE GARFIELD AUTOMOBILE CO.
Manufacturers and Repairers,
1199 Garfield Blvd.,

Telephone Gray 4072
Chicago, Ill., Mar. 18, 1906.

No-Ko-Rode Co., Chicago, Ill.

Gentlemen: Having made a thorough test of your compound, we find it absolutely does away with the corrosion of the spark plugs in our engines, we also find the engines run much steadier with the treated gasoline and there is a great decrease in the smoke and odor.

After our most careful tests as to the efficacy of No-Ko-Rode in preventing the corrosion of the spark plugs, and decreasing the smoke and odor, we can but give your compound our hearty endorsement to all owners of automobiles and gasoline engines.

You may consider yourself at liberty to use this endorsement as you may choose.

Wishing you the best of success in the sale of the compound, we are,

Yours truly, WM. SANDELL.

No-Ko-Rode

A Chemical Compound for Treating Gasoline, Naphtha and Kerosene

Prevents corrosion of spark plugs. Increases the power. Steadies the machine. Lessens wear and tear of engine. Decreases smoke and odor. Makes a saving in Gasoline. Increases light and heat. Prevents the needle in lamps and stoves from clogging.

NO-KO-RODE 50 CENTS PER TUBE

SPECIAL RATES TO DEALERS

NO-KO-RODE

is put up in tubes to treat 50 gallons of oil. In order to introduce this compound, one tube of gasoline and naphtha, also one tube of kerosene compound will be mailed to any address in the U. S. on receipt of the price of one tube, with a guarantee if not satisfactory money to be refunded.

ADDRESS **NO-KO-RODE**

The Illinois Chemical Laboratory
Suite 825-830 225 Dearborn St.

No-Ko-Rode

GEO. A. CRANE & CO. 1208-1210 Michigan Avenue
Sales Agents KNOX AUTOMOBILE CO. *SPRINGFIELD, MASS.*
Phone Calumet 1189
Chicago, February 2, 1906.

Illinois Chemical Laboratory,
Chicago, Ill.

Gentlemen: I have given No-Ko-Rode a very thorough test, having used it for five months in a four-cylinder car of well known make. I find that it eliminated the sooting of spark plugs entirely and decreased the odor of exploded gasoline.

I am personally acquainted with Mr. J. J. Straight, who is operating Knox cars to the number of six for hire, and who tells me that his experiences have been the same as my own.

I believe this compound, if properly used, is a great benefit to the average motors.

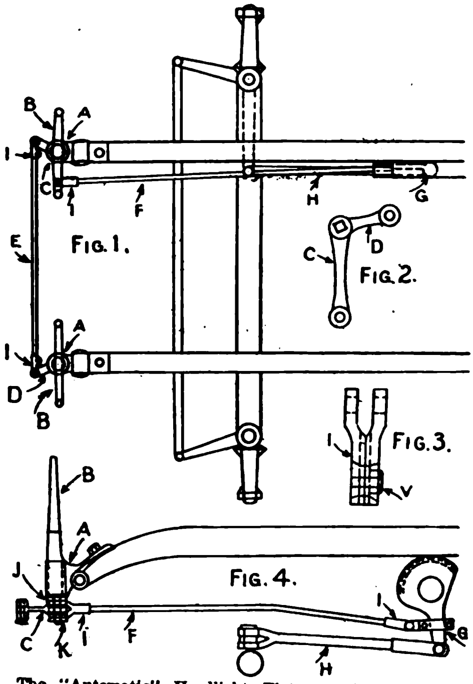
Very truly yours, RICHARD BACON, JR.

No-Ko-Rode

The "Automatic" Headlight Shifter

Automatic Headlight Fixture Co., 69-71 Woodbridge street, Detroit, Mich., are putting out a shifting device which automatically turns the headlights of motor cars in any direction assumed by the front wheels of the car. The drawing herewith illustrates the principles upon which it works, but, of course, there is practically no standard style, as each model of car must be specially fitted.

Referring to the sketch it will be noted that (A) is the bracket which is drilled and reamed to fit the shank of the fork (B), which on its lower end carries, first, a steel washer (J), held in place by a nut. Under this nut is the bell crank (C), on the right side, and the single crank (D) on the left, which are squared on and held by a nut (K), which, when tightened, jams the whole.



The "Automatic" Headlight Fixture. For explanation of lettering see text. Fig. 1, plan view of complete fixtures as applied to car. Fig. 2, detail of bell crank (C). Fig. 3, detail of yoke on ends of rod (E). Fig. 4, side view of car frame and "automatic" lamp fixture attachments.

(C) is the rod which goes across the front and connects the two forks by means of the cranks (C) and (D), and the yokes (I), which are split to allow for the adjustment of the rods, which are a close fit without threads, being slipped in and tightened by means of the screw (L) on the yokes (I).

(F) is the rod which connects the long arm on the bell crank (C) to the clamp (G), on the steering arm just above the rod (H) of the steering gear.

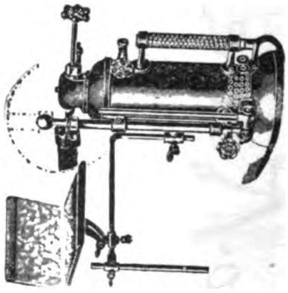
This arrangement prevents vibrations being communicated to the lamps.

Volcano Torches

The various styles of Volcano Torches, manufactured by the Volcano Blow Torch Co., 237 East 17th St., Erie, Pa., are constructed on the same general principles but differ slightly in makeup to meet the various requirements of the work for which they are respectively intended. They can be refilled while in action and kept in operation indefinitely without in any way disturbing the steady blaze.

The body of each torch is a steel cylinder having a safety valve and capable of resisting 2000 lbs. pressure per square inch. An ordinary No. 3 lamp burner mounted on a tank, serving as the base of the torch, is used to heat the generator and keep up the pressure of the torch instead of a starting cup.

Volcano torches are designed especially for machine shops and tool rooms for straightening work between lathe centers, especially armature and crank shafts where the heat must be confined to a small space. They are also equally efficient for tempering. These torches are particularly adapted to cycle and automobile repair shops' use, as they do everything in the line of brazing, heating, straightening and bending, and are handy in starting gasoline and gas engines by simply heating the exploding chamber and air suction pipe, which can be accomplished in a few minutes.



The No. 7 Volcano Torch with Gasoline Pump Attachment. Furnished with one, two, or three adjustable burners.

The flame of these torches can be regulated from a blaze that will heat a 2-inch steam or gas pipe in about 3 minutes to a cherry red, to a needle flame that will suit all kinds of work.

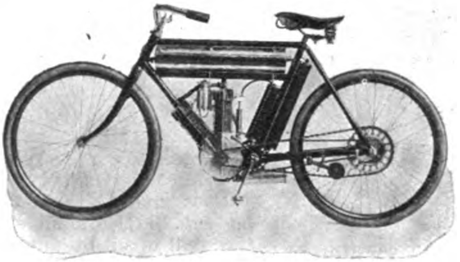
The No. 7 torch shown herewith is fitted with the latest improvement in adjustable burners. This burner can be swung in any degree angle, while the torch is in action or under pressure. This torch can be furnished with single, double or triple burner and is therefore suitable for both light and heavy work.

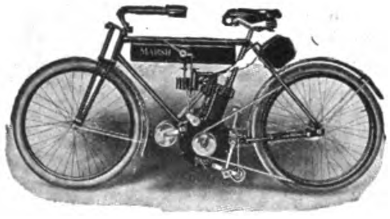
"Volcano" torches are simple in construction and all parts are interchangeable. Any intelligent person can operate them successfully, plain directions being furnished with each machine. Style No. 7, here shown, lists at $18.50, painted and with gasoline pump attachment, and $21 nickel plated, including pressure gauge. About 11 other styles are offered ranging in price from $15 to $45.

A "Thoroughbred" motorcycle, the product of Reading Standard Cycle Mfg. Co., Reading, Pa., run the free-for-all race at Long Beach, Cal., covering 1½ miles, on a sandy beach, in 1.43, the best time of the day.

MARSH-METZ
MOTOR-CYCLES

The most complete and superb line of Motor-Cycles in the world





THE combination of the best points of two good motor-cycles—found in the MARSH-METZ– makes it absolutely the greatest motor-cycle value to be obtained anywhere. Those who are fortunate enough to secure the agency will find the MARSH-METZ the most satisfactory motor-cycles they have ever handled.

Our capacity is very large, and you are sure of prompt deliveries. Four models and a Tri-car.

American Motor Company
Brockton, Mass.

The "Porter" Ignition Battery

Evansville Ignition Battery and Electric Co., Evansville, Ind., claim the "Porter" ignition battery to be simply constructed, capable of quick charging and possessing great reserve power. They sell it under a guarantee. This battery is made in two sizes. No. 1, the smaller size, is of 6-volt strength and of 60 ampere hour capacity at a sparking rate. It is contained in three best quality hard rubber jars reinforced at all points subjected to strain and securely set with a special composition which is impervious to weather conditions, therefore preventing damage and perfectly insulating each cell.

The "Porter" Ignition Battery.

Each cell contains two very heavy and substantially constructed plates or grids, with one side of each covered with a lead plate, this construction holding the active material in position against the concussion and rough usage of vehicular traffic. Each plate is insulated from the other by improved patented hard rubber separators.

The elements are connected by straps made of lead alloy having maximum conductivity and strength, not one particle of solder being used. These plates are submerged in the electrolyte, which is made of a chemically pure acid.

The hard rubber cover, provided with an extra large vent hole, rests on a shoulder on the inside of the jar. The hard rubber plug screwed to the cover is provided with staggered holes to prevent slopping and spraying through.

The battery is thoroughly sealed so that it is impossible for any of the electrolyte to escape and the material of which the plates are composed yields a large capacity and yet at the same time possesses qualities that give great strength and does away with the brittleness often found in plates of this character.

The cells are enclosed in a heavy quartered oak case, dovetailed together, very highly polished and treated by a special process which gives long life. The cover is held on with substantial brass hinges and is fastened with metal hooks, which permit same to be opened when charging. The strong leather carrying handle is fastened to the cover by nickel plated cleats.

Two heavy binding posts are moulded into terminal lugs which extend through the case at one end and are plainly marked "N" for negative and "P" for positive. These posts will not corrode.

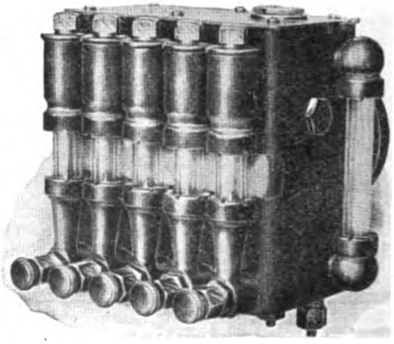
Upon actual test this battery lasted 3,800 miles on a two-cylinder car without recharging.

The No. 2 sparking battery is identical in construction to the No. 1, but has twice as many plates and consequently double the capacity. This battery weighs complete forty-five pounds and is 11 inches long, 8¼ inches wide and 8 inches high.

The No. 1 batteries weigh 25 pounds complete and are 11 by 6 by 8 inches.

1906 "Crandall" Lubricator

The accompanying cut illustrates the latest form of "Crandall" Lubricator made by National Sewing Machine Co., Belvidere, Ill. In this lubricator there is but one pump, which is large and requires no adjustment. It furnishes a greater amount of oil than is needed by the feeds, the surplus passing through a pressure valve, which is set and works positively. This valve being inside, cannot be tampered with. The pump is driven by a worm and gear, ratio 30 to 1. The driving shaft passes through the back of the lubricator and has a long bearing. Liquid sight feeds are employed and are so constructed as to entirely avoid "backing down" of the water or glycerine used, it is claimed. The piping of the Crandall system are constantly held full of oil by automatic check valves, and as soon as the pump commences working the oil begins to flow to the bearings. Conversely, as soon as the pump stops the feeding of oil stops, too. There is no pressure in the system except when the pump is in operation, for as the pressure is hydraulic, one drop of oil from the case relieves all pressure. The sight feeds are backed by a strip of spring brass enameled with luminous enamel, showing white in the daytime and violet at night. These strips may be removed and cleaned quickly and easily. The feed adjustments cannot jar loose.



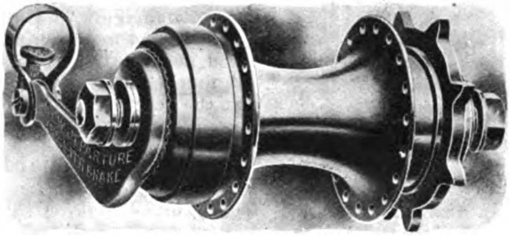
1906 "Crandall" Lubricator.

Fahnestock Electric Co., successors to the Fahnestock Transmitter Co., manufacturers of the Fahnestock spring binding post, have removed to 129 Patchen avenue, Brooklyn, N. Y., where they have larger quarters and increased facilities for handling their trade on this well-known specialty.

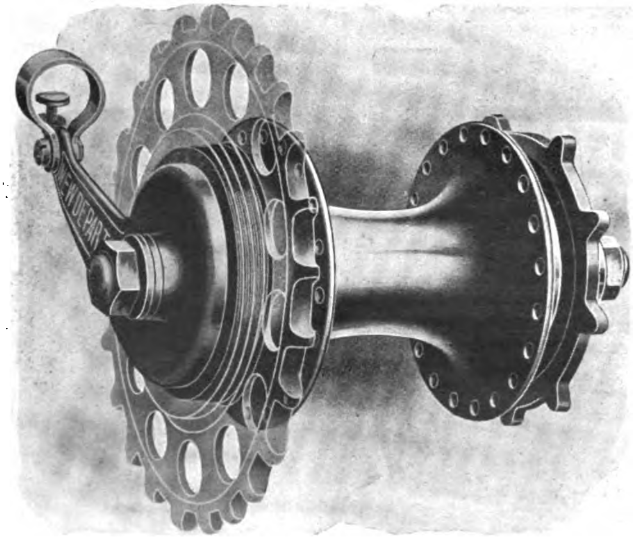
New Departure Hubs

For Sale by all Leading Jobbers

Model M and F Hubs have the same general outline as our regular Coaster Brake.
Model M for ordinary wheels, spoke holes 28-32-36, Length over all 3½"
Model F for Tandem and Motor Cycles, spoke holes 32-36-40, Length over all 4 5-16"



Regular Coaster Brake A
Model A, 1⅜ to 1¾" Chain line, Length over all 4¼"
Model A Special, 1⅜ to 1⅝ Chain line, Length over all 4 1-10"



Model B and BB for Motor Cycles and Tandems
Model B, For band driven Motor Cycles
Model BB, For chain driven Motor Cycles

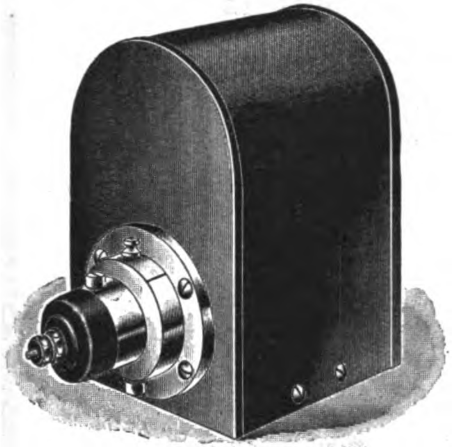
IT IS SUFFICIENT TO SAY THAT THEY ARE NEW DEPARTURES

Manufactured by
THE NEW DEPARTURE MFG. CO.
Bristol, Conn., U. S. A.

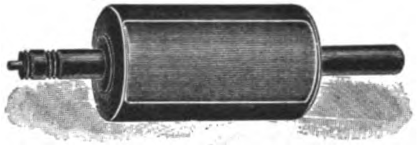
Selling Agents,
John H. Graham & Co.,
113 Chambers St., N. Y. City.

The "Nieuport" Low Tension Magneto

The "Niuport" low tension magneto, marketed by the Albert Champion Co., 541 Tremont street, Boston, Mass., is similar in general construction to many others now on the market, but differs in a few important details. All the parts, including the magnet, are interchangeable, and it can be taken apart and put together in a few minutes without special care or the necessity of bench-marking the parts.



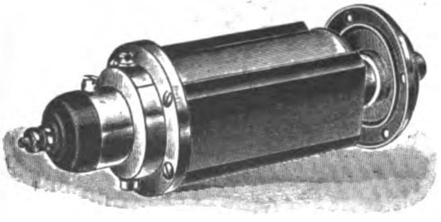
Exterior View "Niuport" Low Tension Magneto.



Armature Core of the ' Nieuport" Magneto

The steel magnets are enclosed in a copper case and are kept in place by pressure screws through the bronze base plate to which the case is attached.

By keeping the limbs intact more powerful magnets are obtained and at the same time they are rendered less liable to demagnetization while the machine is in use. This case is made absolutely tight by the application of the base plate and the two bearing plates which completely protect the apparatus, especially the magnet poles, which are always sheltered against rust, often the cause of bad running.



Complete Armature of the "Nieuport" Magneto

In the "Niuport" magneto the magnet poles are not solid to the magnet, but are snugly attached only on the two side bearing plates that carry the armature shaft and the armature coil live end. They are held tight by pressure screws that are used on the magnets through the base plate.

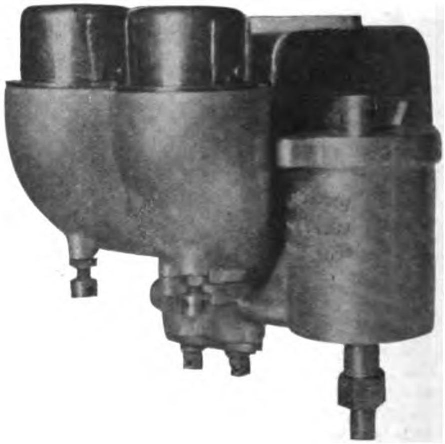
By this disposition the magnet poles do not depend on lathe operations, and accuracy is very much more easy to obtain than from a series of complicated operations of fitting, assembling, drilling holes, tapping for screws, etc.

The construction of this magneto allows the reduction of the magnet poles with impunity.

The special shape of the armature permits the complete enclosing of the winding by the sheets of copper soldered against the armature core. This is an important feature, as it prevents the dampness, dust, and oil from penetrating the armature, and thus doing much damage. The disposition of the armature allows much more space for the winding and permits the using of many more spirals. A much higher tension is obtained than usual at the starting point.

The Richard Carburetor

The Richard Carburetor, illustrated herewith, manufactured by Francois Richard, 511 West Fifty-ninth street, New York, N. Y., is of very novel shape. It has two air valves and two gasoline spray nozzles. On low speed one of each is shut off by a piston which is operated by the usual throttle lever. The air valves are ordinary poppet valves which are covered by slotted caps to keep out dirt. The mixing chamber is surrounded by a hot water jacket. The special advantages claimed for this carburetor are great flexibility and economy, as the one set of valves is regulated for high speed and the other for low speed, and therefore there is no waste occasioned, as when the car is running on high speed, fuel is admitted through both valves, and when the car is running at a low speed the high speed valves are cut off entirely. These two sets of valves also permit of such a great range of engine speed as to almost make the change gear unnecessary.

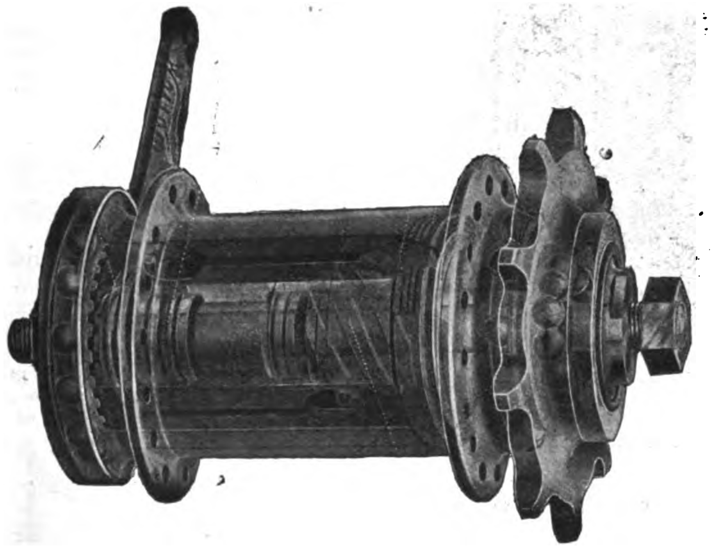


The Richard Carburetor.

THE MORROW

Motor Cycle Coaster Brake

Is being used exclusively by most of the Leading Manufacturers



IT IS THOROUGHLY RELIABLE AND SERVICEABLE

We wish to call the attention of the trade to the fact that we are now furnishing a brake for belt-driven Motorcycles in 1⅝", 1¾", 1⅞", 2", 2⅛" and 2¼" chain lines. We also make a Morrow Brake for chain driven machines with 1 15-16" chain drive each side, and furnish either 18, 15, or 17-tooth sprocket on the left side.

THE MORROW MOTOR CYCLE COASTER BRAKE is made on the same principle as the bicycle brake (experience and use having demonstrated that this is the only correct and scientific construction). We have adopted a 17-16" axle for motor cycle use, as heavier construction is necessary to stand the severe strains. We claim that the **Morrow** is the only motorcycle brake that is suitable on high-powered motorcycles, and substantiate this statement by the fact that the largest manufacturers of motorcycles all over the country are using the **Morrow Brake** exclusively on their machines.

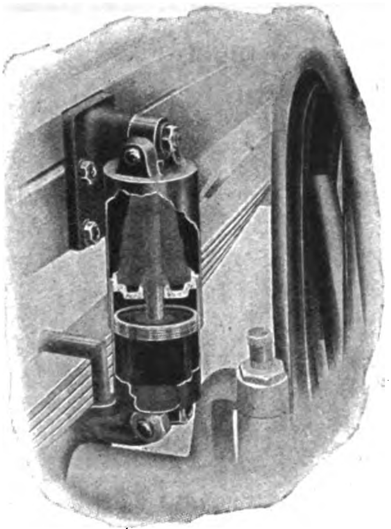
The G. H. Curtiss Mfg. Co., of Hammondsport, N. Y., makers of the "Hercules" Motorcycle use the **Morrow** exclusively, and as their machine has a 5 H. P. double motor, you can realize the strain which our brake will stand in actual service. Send for full particulars—it will pay you to investigate.

THE ECLIPSE MACHINE CO.

ELMIRA, N. Y.

Mechanical Features, Kilgore Air Cushion

The Kilgore Automobile Air Cushion Co., 46 Columbus avenue, Boston, Mass., manufacture a shock eliminator called the "Kilgore Automobile Air Cushion," which was described briefly in a past issue of the Journal. As the patent has now been allowed we are enabled to more fully describe it and to illustrate the interior workings of the device.



Kilgore Automobile Air Cushion Attached. Sectional View Showing Interior Construction.

The Kilgore automobile air cushion "shock eliminator" is made in the most substantial and workmanlike manner from phosphor bronze, seamless brass tubing and Bessemer steel.

The upper outer part is a fender to keep out water, mud and sand. Inside of this outer shell, held in place on top of the cylinder by a light coiled wire, is a chamois envelope, which excludes every particle of fine dust from the piston rod and cylinder. The functions are performed entirely within the air-tight lower cylinder.

The lower end of the Kilgore "shock eliminator" is attached through the universal coupling joint to the axle or spring seat by a fixture.

The piston head has two split metal packing rings, ground to fit accurately the walls of the cylinder. The piston rod of Bessemer steel is securely attached to the bronze casting, forming the cap of the outer shell, and this in turn is attached to the upper stub plate bolted to the frame through a universal joint coupling.

The cylinder is a very substantial phosphor bronze casting bored and reamed with the greatest care. The cylinder head is especially strong and screwed securely within the cylinder. A leather thimble packing makes all tight where piston rod passes through this cylinder head. As no dust can get in the lubrication put in the cylinder, when assembled at the factory, will last for an entire season at least.

To prevent the too violent spring action, four grooves of the proper depth and width are cut lengthwise of the cylinder in the inner walls, at equal distances apart. These grooves of equal length begin and end at different distances from the top and bottom of the cylinder. This arrangement allows the air sufficient passageway through all four grooves, so that it is not impeded with the action of the springs on good roads, but when the springs have a tendency to go too far down these air passages are reduced in capacity by the passing of the piston beyond the ends of one or more of them; this checks the flow of air gradually, and thus acting on the spring prevents it going down too fast. When the last groove is passed then the motion of the spring is stopped on the elastic dead air cushion in the bottom of the cylinder.

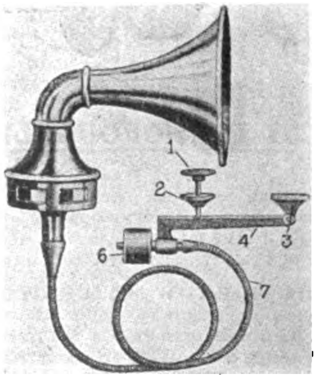
This downward plunge being well taken care of, the recoil will not do any damage, but whatever it is, it is taken care of in exactly the same way as the downward motion. The dead air space in the bottom and top of the cylinder takes the place of the rubbér bumpers and straps respectively.

The fittings to attach the Kilgore air cushion are supplied by the Kilgore Company.

'Leavitt" Siren Auto and Boat Horn

The "Leavitt" Siren horn is manufactured by the Uncas Specialty Co., 21-27 Shipping St,. Norwich, Conn.

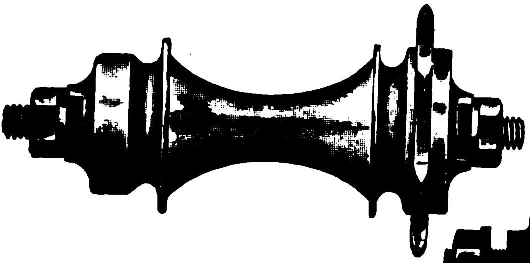
This horn is mechanically operated by means of a small friction pulley brought against the flywheel of the engine and controlled by a small foot-lever or button. The tone of this horn may be varied instantly from a soft hum to a blast that may be heard for miles. The Leavitt Siren horn needs no cleaning, and runs on adjustable ball bearings. The horn is furnished with flexible shaft and attachments complete for $35, and the price without atttachments $20.



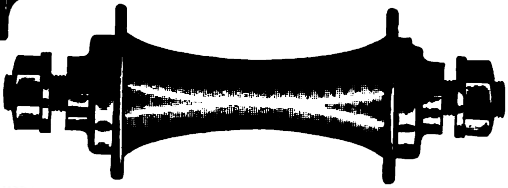
The New Siren Auto and Boat Horn. 1, Plunger; 2, Plate for foot board; 3, Bracket under foot board; 4, Lever; 6, Friction wheel; 7, Flexible shaft.

To obtain the necessary increased facilities to supply the demand for their gearless transmissions, the Gearless Transmission Company, Glens Falls, N. Y., have removed to Rochester, N. Y.

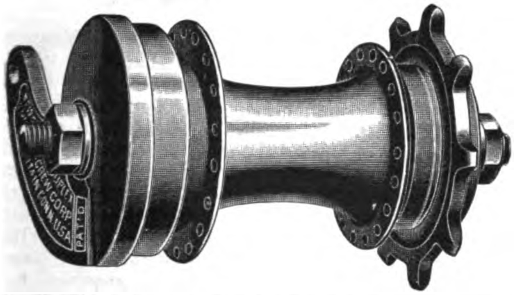
CORBIN HUBS FOR 1906



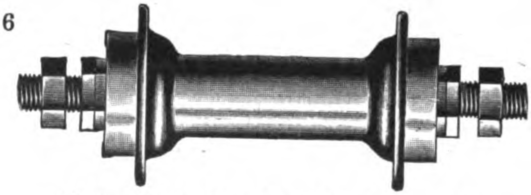
Bicycle Rear Hub Model No. 26



Bicycle Front Hub Model No. 16

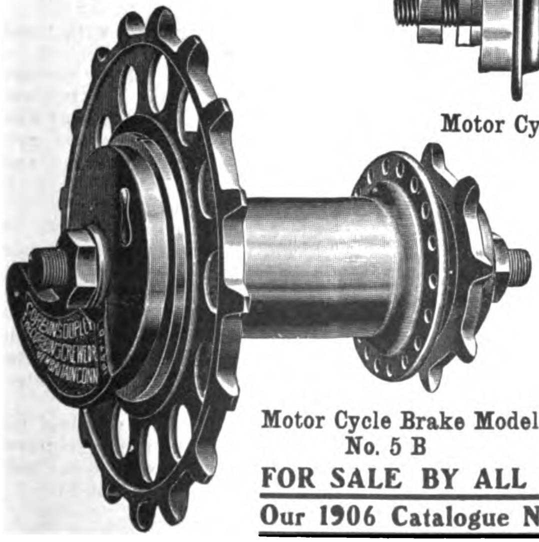

CORBIN DUPLEX
CORBIN SCREW CORP
NEW BRITAIN CONN USA
PAT'D

Duplex Coaster Brake Model No. 6



Motor Cycle Front Hub Model No. 15

Special Models for Chainless Tandems and Extra Wide Motor Cycles


CORBIN'S DUPLEX
CORBIN SCREW CORP
NEW BRITAIN CONN

Motor Cycle Brake Model
No. 5 B

FOR SALE BY ALL DEALERS

Our 1906 Catalogue Now Ready

The Corbin Screw Corporation

NEW BRITAIN, CONN.

The Abell Speedometer

J. G. Judson Co., 105-107 Chambers st., New York City, is the selling agent for the Abell Speedometer. This speedometer indicates speed, total mileage and trip mileage.

It shows at a glance the accurate speed of travel up to 60 miles per hour. The pointer is directly operated by the pressure of weights, governed by centrifugal force. It is not affected by wear, weather or position.

The Odometer records up to 10,000 miles total. The trip Odometer registers up to 100 miles and is provided with a small stem like a watch by which it can be reset in a moment to zero after each trip.

The speedometer is driven by a flexible shaft of their own make. A notable feature is the absence of vibration of the speed pointer. The speedometer can be attached to any suitable place on the car and is mounted on a pivoted bracket which allows it to be adjusted to any convenient angle so that it may be easily read from the seat.

The Abell Speedometer.

The gears and universal fittings for driving the shaft are of original design and can be attached to any type or make of car in a short time by any repair man. The different diameters of wheels requires only a different size of the small gear wheel on the end of the shaft, which is fastened by a cotter pin and can quickly be removed. These small gear wheels are supplied in different sizes for wheels from 26 to 36 inches.

The speedometer is guaranteed from all defects for one year and lists at $50 complete.

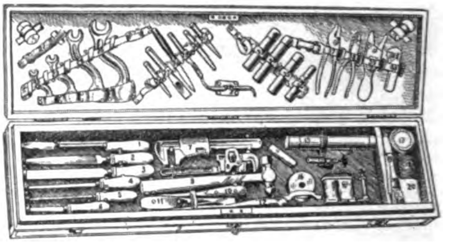
The "Willis" Tool Chest and "Electrophone" Horn

The "electrophone" horn and the Willis tool chest, marketed by E. J. Willis Co., 8 Park Place, New York City, are important accessories to an automobile equipment.

The No. 2 tool chest is made of 1-in. hard wood with brass hinges and hasp and is 42 in. long by 10 in. wide by 3½ in. deep. This is a convenient sized chest to screw down on the step of an automobile. A ⅞ lip around the top of the chest makes it watertight when the lid is closed. It is hardwood finished, brass bound, lock jointed and the top is covered with rubber.

Each tool is firmly held in its proper place by a spring and does not rattle. The smaller and lighter tools are held on the inside of the lid by spring clips and leather pockets and straps.

The tools furnished are those found by experience to be most essential and infrequently supplied with the automobile and the assortment is composed of a 12-oz. soldering copper, 5 styles and sizes of files, 14-in. adjustable wrench, 10-in. "Trimo" steel pipe wrench, 12-oz. ball pin machinist's hammer, three assorted screw drivers, assorted emery cloth, assorted copper wire, ½ lb. roll best tire tape, 4 oz. can rubber solution, assorted rubber patches, brushes for rubber solution and acid, 4 oz. stone bottle vulcanizing acid, 4 oz. bundle soft solder, three assorted wrenches, each for two size nuts, two assorted cold chisels and ⅜ case chisel, tool steel concave bearing scraper, two punches, assorted cotter pins and one extractor, flour of emery, gasoline hydrometer, gear cleaning brush, two pliers, 7-in. pipe wrench, 6-in. adjustable wrench and an oval-shaped plumber's torch. Handles are included with the files and some of the solder.



Willis No. 2 Auto Tool Chest with Tools

The list price of the No. 2 chest with these tools is $30.

The No. 1 chest, which is rubber covered throughout and has brass bound top, bottom, sides and corners, with same tool, lists at $35.

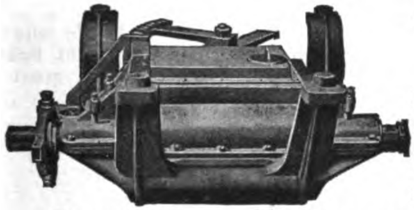
The "electrophone" automobile horn produces musical sounds and alarms, and although its application is numerous it is especially adapted for automobiles.

They are made of finely polished brass, in different sizes, and are blown by merely pressing a button. They continue blowing as long as a connection is maintained. Numerous buttons can be distributed throughout the car if desired. Ordinary dry cells are used, and those already installed on automobiles can be used for operating the "electrophone."

A set of six or eight dry cells will last for at least a year if used for the horn exclusively. List price for the horn with 6-in. bell, one push button, and cord or wire, is $15.

The prices quoted for the Detroit combination tool in our march issue were not correct. The correct prices are Model A, $40; Model B, $55. The tool is made by Detroit Tool Co., 120-122 Liberty St., N. Y., and was fully described in our March number, page 284.

TRANSMISSION GEARS

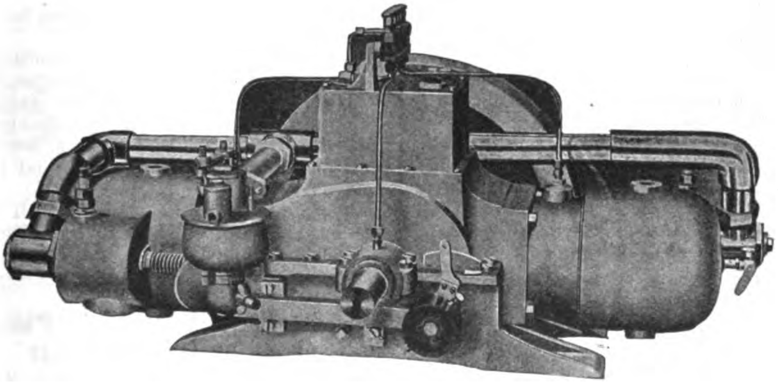


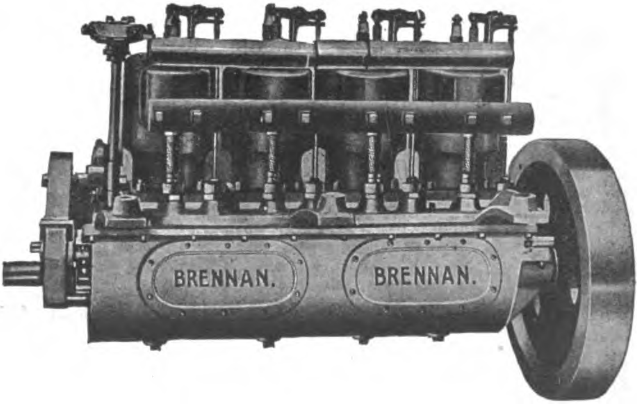
WE know how to make the best gears economically, and as we manufacture in quantities, we can sell at prices below what it costs manufacturers to make gears. Let us figure now for your next year's supplies.

Planetary Gears for any size of car up to two-ton trucks. Sliding gear transmissions up to ten-ton trucks. Single chain, shaft, or double chain drive.

SYRACUSE GEAR CO., Syracuse, N. Y.

MOTORS



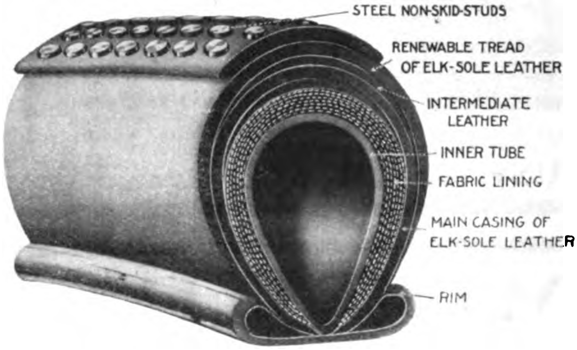


WE make motors for all standard makes of cars, including commercial automobiles. For full particulars write to

Bronnan Motor Co.
SYRACUSE, N. Y.

The Salisbury Leather Tire

The Salisbury Tire, made by the Salisbury Tire Co., Owosso, Michigan, is built of leather and fabric, with steel studded tread, and with no rubber but the air tube. It will not puncture, rim-cut, blow-out, burst or blister, and is claimed to be fully as resilient as any other pneumatic tire, as it has the same sized air chamber. The Salisbury tire is also proof against skidding and slipping. The studs of the tread are held solid by imbedding their clinches in strong sole leather, which is not simply a covering over the tire, but a part of the tire itself. This method of construction makes the studs an integral part of the tire, and they cannot work loose or pull out. The leather used in the Salisbury tire is rendered waterproof by a special tannage, and the tire is guaranteed by the makers not to stretch, crack or get out of shape under service conditions. This tire is built to fit the standard Clincher, Dunlop, and Fisk Rims, and is sold at the same price as other pneumatic tires.


STEEL NON-SKID-STUDS
RENEWABLE TREAD OF ELK-SOLE LEATHER
INTERMEDIATE LEATHER
INNER TUBE
FABRIC LINING
MAIN CASING OF ELK-SOLE LEATHER
RIM

The Salisbury Tire, Sectional View.

"Neverout-Pennsylvania" Tail Light

The "Neverout-Pennsylvania" tail light, recently brought out by the Rose Mfg. Co., 911 Arch St., Philadelphia, Pa., is so made as to illuminate the license number on an automobile and therefore comply with the state law which require the license numbers to be illuminated from sunset to sunrise.

PENNA 1906
4480

The "Neverout-Pennsylvania" Tail Light and License Illuminator.

It is so constructed that the bracket base plate is extended and attached to a vertically inclined arm with a horizontal holder. The license number is attached to an adjustable arm which fits through the holder. By this means the license is in register with the flame and lens which serves to brilliantly illuminate the number.

This particular tail lamp is equipped with a mirror lens reflector, like a searchlight, so that it always retains its original brilliancy, and concentrates a strong light on the place desired.

The lantern, which is built on the improved "Neverout" system, shows a bright light to the rear, which can be seen at a great distance. The lantern is guaranteed to stay lit under any conditions.

An ingenious feature of the holding device is the adjustable arm, which can be made to hold any size of license plate. On it is a spring steadying arm, near the bottom, which holds the license plate firmly in position, so that it will not rattle or swing and mar the car.

The "Neverout-Pennsylvania" tail light is meeting a long-felt want, and the Rose Co., who have applied for a patent, anticipate large sales of this device.

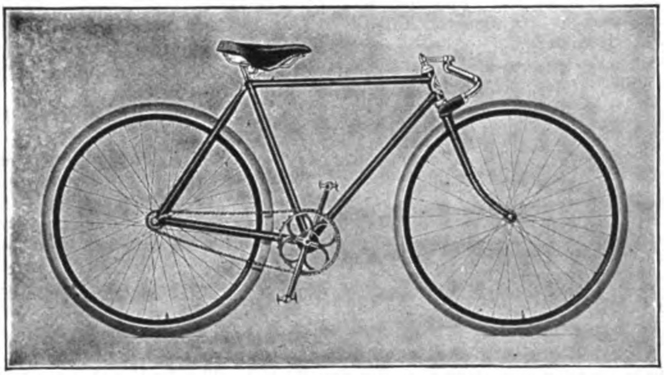
The Standard R. B. Co.'s Patents on Annular Ball Bearings

The Standard Roller Bearing Co., 48th and Girard avenue, Philadelphia, have notified the trade that they own a number of United States patents which are claimed to broadly cover annular bearings of the full and silent type, and they call particular attention to their patents numbers 417,340 and 434,472. They state that they are taking immediate steps to protect their rights under these patents, and that their attorney, Mr. Augustus B. Stoughton, 1506 Land Title Bldg., Philadelphia, is now bringing suit for collection of past damages and profits and for a preliminary injunction against the present importers and users of such bearings.

Will Job Accessories

J. J. Mandery Rochester Automobile Co., 150 South Ave., Rochester, is enlarging and remodelling his salesroom and installing a separate sundry department, where he will handle in a jobbing as well as retail way everything useful to the automobilist. He desires catalogues and prices of every sundry and accessory manufactured in the country.

YALE and SNELL BICYCLES

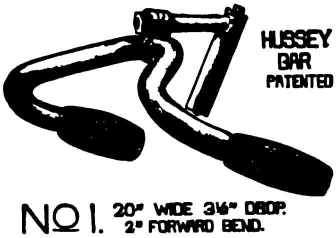


OUR 1906 LINE IS EXTRAORDINARY VALUE

BICYCLE dealers make money pushing a line of wheels which does not require pushing, and that line for 1906 is unquestionably the **"Yale"** and **"Snell."** The **"Yale"** has reached a point higher than that ever attained in the construction of a bicycle, while the **"Snell"** Bicycles for the coming year are an interesting proposition for anyone because they represent a very great value.

It is better to sell the **"Yale"** and the **"Snell"** Bicycles than to sell against this line. A word to the wise is sufficient.

Write for catalog and terms.


HUSSEY BAR PATENTED
NO 1. 20" WIDE 3½" DROP. 2" FORWARD BEND.

Hussey Handle Bars

the most complete line for 1906 ever offered. New Shapes. New Features. Write for prices.

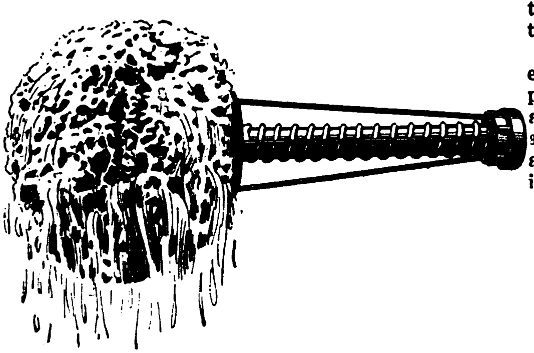
The CONSOLIDATED MFG. CO., Toledo, O.

1906 "Ideal" Carriage Washer

The "Ideal" carriage washer, manufactured by the "Ideal" Carriage Washer Co., 148, 150 and 152 Lenox St., Rochester, N. Y., and described in our June, 1905 issue, page [illegible]4, has since been very much improved.

The device is now equipped with a dished solid rubber cup, against which the sponge is held. The hooks holding the sponge are located below the edge of the rubber cup, thereby eliminating the possibility of scratching or marring the finest finish. The inside of the cup is brass lined, as are also the holes through which the wires pass.

The sponge is compressed by a strong coil spring located in the handle, which is quick and positive in action and keeps the sponge in constant contact with the vehicle body.



The "Ideal" Carriage Washer.

The "Ideal" carriage washer fits any ordinary hose and can be used without the sponge for spraying the body to loosen the mud, etc., before using the sponge to thoroughly cleanse the vehicle.

The "Ideal" Company furnish an overhead arm 6 feet long for carrying the water supply pipe. It is attached to the ceiling at one end, swings around so that the operator can work around a vehicle without dragging a long hose with him.

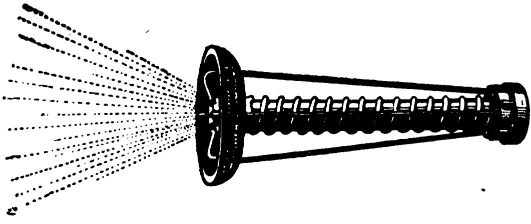


Illustration of Spring, Rubber Cup and Sponge Hooks of the "Ideal" Carriage Washer.

The list price of the "Ideal" carriage washer, including the overhead apparatus, is $12.50. The washer alone is $3.00.

Republic Leather Specialties

Republic Belting and Rubber Supply Co., Cleveland, O., manufacture a line of leather specialties, leather belting and power transmission supplies, also a tool outfit put up in a canvas case.

Their V-shaped leather beltings for fan belts, etc., are furnished in any length desired and to fit any pulley. They are made endless or fitted with detachable couplings, sewed and waterproofed, if desired. These belts can be sewed with waxed thread or wire. They also make flat belts for straight, cone or flanged pulleys. These can be furnished in one piece in lengths up to 56 inches and of any width. They are cut from specially selected stock.

This concern makes a specialty of friction leather for clutches, etc. This is cut from the finest imported Swiss hides and curried by a special process to make it firm and tough. It is furnished in thicknesses of ⅛ to ¼ inch.

The "Republic" automobile tool kit contains every necessary tool for making a road repair. The tools are selected with care and are of the best material and design. They are as light as is consistent with strength and durability. The kit comprises 30 articles in a canvas case and weighs 10¼ lbs.

R. B. McMullin to go with the A. O. Smith Co.

Mr. R. B. McMullin, who has been general manager of the American Motor Car Manufacturers' Association, will retire from the management of that Association on April 15, at which time he will associate himself with the A. O. Smith Co., the well-known makers of automobile parts, engines and transmissions, of Milwaukee, Wis. Mr. McMullin will establish offices for this company in the Marquette Building, Chicago, Ill., and will have entire charge of the selling end of the business.

Benford Spark Plugs and Cores

The 1906 line of improved mica spark plugs and cores, manufactured by E. M. Benford, Wakefield, New York City, N. Y., has been carefully tested before placing on the market.

The inside wrapping or core of Benford plugs, made of the best sheet mica, is wound by machinery without the use of shellac. The outer protection for the core is made of selected white mica washers. The central electrode is one solid Bessemer steel rod. The contacts are imported meteor wire made especially for sparking purposes.

The new two-piece "Monarch" plug is made with a steel shell and can be taken apart and cleaned in an instant. The 1906 single piece "Peerless" spark plug is made with a brass shell and sparks between two meteor wire contacts. The "Perpetual" spark plug is made with a brass shell and is simple and oil and soot proof.

Threads are furnished for ½ inch pipe Metric, Winton, Ford, Thomas, and Packard cars and the Indian motor cycle.

CORK INSERTS

The "COMPO" Clutch and Brake

Patented **(WITH CORK INSERTS)** **Patented**

We license manufacturers to make "Compo" or Composite clutches by equipping THEIR TYPE OF CLUTCH with Cork Inserts.

ON APPLICATION WE WILL GIVE YOU THE **REASONS**

WHY THE AUTOCAR COMPANY of Ardmore, Pa., (licensee) inserted **Cork Inserts** in its type of disk clutch (as herein illustrated) in more than two thousand cars during 1904 and 1905.

WHY THE AUTOCAR COMPANY will use **CORK INSERTS** in about fifteen hundred automobile clutches during 1906.

WHY **CORK INSERTS** should be used in all types of CONE CLUTCHES in place of leather.

WHY **CORK INSERTS** should be used in alternate disks in metal to metal clutches, or in place of leather faced disk clutches.

WHY THOUSANDS OF CORKS are in use in loom clutches, and why **CORK INSERT** clutches are rapidly displacing the leather faced clutches.

WHY THE CROMPTON & KNOWLES LOOM WORKS, of Worcester, Mass., (licensee) is shipping more than one hundred looms so equipped, per month.

WHY THE CROMPTON-THAYER LOOM COMPANY, of Worcester, Mass., (licensee) has adopted the "**COMPO**" **CORK INSERT** clutch for practically its entire output.

WHY THE WOOD WORSTED COMPANY has ordered 600 looms and will soon order 900 more looms fitted with **CORK INSERT** clutches for the new mill now being erected at Lawrence, Mass.

WHY MORE THAN ONE MILLION CORKS have been used in electric street railway brake shoes in Boston and vicinity. Licensees, J. B. & J. M. Cornell Company, New York, N. Y., and the Gibby Foundry Company, East Boston, Mass.

WHY THE PECULIAR AND GREAT FRICTIONAL QUALITY OF CORK is neither diminished nor affected by wear, dust, moisture, atmospheric conditions, water, oil or other lubricants.

WHY TESTS OF CLUTCHES made at the Worcester Polytechnic Institute show that at same pressure of clutch, the "**COMPO**" clutch transmitted twice the pound feet of Tordue transmitted by the standard leather faced clutch of same size and area of clutch surface, and this with great smoothness of engagement and without gripping or seizing; and **WHY** AT ONE-HALF THE PRESSURE the "**COMPO**" clutch transmitted equal Torque.

WHY THE REPORTS OF TESTS made at the Worcester Polytechnic Institute, Perdue University and Lawrence Scientific School of Harvard University showing the remarkable results obtained by the use of **CORK INSERTS should interest you.**

WHY WE WANT YOU to try **one** clutch equipped under our direction.

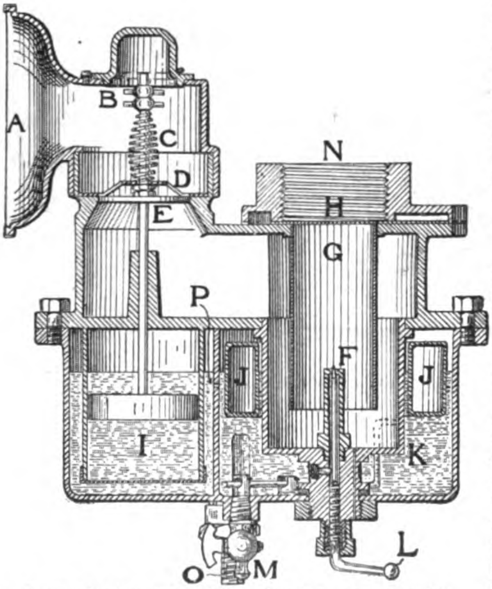
WHY EXPANDING AND CONTRACTING MEMBERS of brakes, or the drums of transmission brakes, should be equipped with **CORK INSERTS.**

For particulars apply to

NATIONAL BRAKE & CLUTCH COMPANY, No. 16 STATE ST., BOSTON, MASS.

Menn's Carburetor

Boston Mechanical Co., 22 Park Square Motor Mart, Boston, Mass., manufacture this carburetor, which is of simple construction and requires no attention but an occasional cleaning after first adjustment. It is made of brass and aluminum in three sizes—1 inch, 1¼ inch, and 1½ inch throttle connection. Connection can be made with either vertical or horizontal inlet. The automatic air feed valve is connected with a piston in a dash pot containing gasoline, thus preventing jerking of the valve and avoiding noise.



Sectional view "Menn's" carburetor. A, air inlet sifter; B, air-valve adjusting nuts; C, air-valve spring; D, air-valve spring support; E, compensating air valve; F, spraying nozzle; G, mixing chamber; H, throttle; I, dash-pot; J, float; K, float chamber; L, needle valve; M, drain cock; N, motor connection; O, gasoline inlet; P, opening between the two chambers.

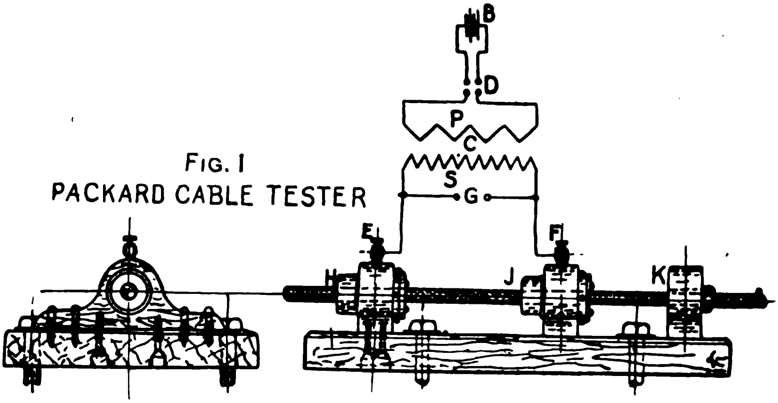
The spray nozzle is placed in the centre of the mixing chamber. The air is filtered once and the gasoline twice before reaching the mixing chamber. The mixing chamber is drained automatically and provision is made for draining each tank. Prices for the three sizes are respectively $25, $35 and $50. Special prices are quoted car makers and prices on other than standard sizes are quoted on request.

Packard Ignition Cable Tester

The Packard Electric Company, Warren, Ohio, are putting out an ignition cable tester in order to eliminate every possibility of failure by the defects of the high tension ignition cable.

The cable tester is substantially an induction coil C capable of producing a 3-in. spark. The primary coil P is connected through switch D to a 4-volt storage battery B. Secondary S is connected to adjustable spark gap G and also to terminals EF, which are mechanically connected to contacts HJ. The latter are spring contacts continually brushing the exterior of the cable. K is merely a guide, and with H and J is mounted on a heavy wooden base which is firmly bolted to a support.

The cable A is drawn rapidly through the guide K and contacts EF, while the spark is continuously jumping spark gap G. If a failure is found, it is immediately apparent by the absence of sparking at G and a vigorous sparking, first at F and then again at E as the bad spot passes these respective points. The sound of the sparking at F and E is much different than at G, which affords an additional means of detecting the defect if the operator does not happen to be looking at the tester the instant the sparking occurs. It was the intention to use a solenoid cut-out for breaking the primary circuit and switching a bell on the battery circuit to give a greater alarm; but, owing to the ease with which a poor spot can be detected, this was found to be unnecessary. The above could very easily be arranged, since the primary current changes in value as soon as the resistance of the secondary circuit changes. Every coil of high tension cable now sent out by this company has a notice attached which reads as follows: "Every foot of cable in this coil has been tested at 30,000 volts and guaranteed free from elctrical and mechanical defects."



Packard Ignition Cable Tester—C, induction coil; P, primary coil; D, switch; B, 4-volt storage battery; S, secondary wire; G, spark gap; EF, terminal; HJ, contacts; K, guide.

COMMERCIAL MOTOR CAR DEPARTMENT

OF THE CYCLE AND AUTOMOBILE TRADE JOURNAL

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Handling the Commercial Car

It is conceded by every user of the Commercial car, that the proper handling and care of the machine, is the chief factor in the securing of results.

One point that is continually overlooked is the fact that great harm can be done by overloading cars. This not only shortens the life of engine transmissions, gearing, etc. but is almost fatal to the tires. The majority of the cases of premature wearing out of the tires may be attributed to this cause, although in a good many instances machines have been sold, equipped with undersized tires to start with.

The Geo. Ehret Brewery, N. Y., furnished the writer with some interesting data regarding the service that they had been able to get out of tires. These tires were used on an electric truck carrying five tons.

With one make of tire the longest life secured was 5 months and 7 days on the front wheels and 6 months and 1 day on the rear wheels, the shortest life was 3 days. With another make the company got 19 months and 25 days' use on the front wheels and 12 months and 10 days on the rear wheels. The shortest life with this make was 3 months.

The above figures show that the one tire was inadequate to carry the load, which in this case was about ten tons, the machine weighing five tons and the load about as much more. This is a point that should be looked into fully by the intending purchaser of a commercial wagon, as the economical running of the wagon depends in no small degree upon the amount of service given by the tires.

In case of the electric wagon, experience has shown that the batteries must be handled by an experienced battery man, one who thoroughly understands their care and who is able to cope with the little problems that come up daily, and the writer has been informed by several users of this type of vehicle, that they considered the services of a competent engineer or electrician essential to the successful operation of electric cars, and when more than three or four machines were in use, that they considered it economy to hire a man to attend only to the batteries, charging, care and repair.

In case of breweries who use the electric vehicle this work could usually be superintended by the electrician in charge of the electrical machinery of the plant, although in some cases this would be impossible, owing to the additional work involved.

An efficient driver is another essential to the successful use of the motor car. The driver need not be a gas engine expert or an electrician, but must have an understanding of the way the machine works and how it is it to be handled to get the best results, and common sense enough to report to his superior when anything is wrong or when anything out of the ordinary happens. The concerns that have had the greatest success with the Commercial car, have been the ones that have given the drivers some training. The money spent in this way is usually well spent, as the car will give better service and will require less repair in the hands of a competent driver.

From the Standpoint of the User

The interviewing of a number of users of commercial automobiles has brought out the fact that in many instances the machines have given prompter service, are capable of doing the work of several horse-drawn wagons, are proving reliable, and in the majority of cases, have proven to be money savers. In other cases, while they have proven more expensive than horses, they were perfectly satisfactory on account of the good service rendered.

The Aeolian Co.'s experience might be cited as an example of this kind. Mr. Wirth, of this company, stating that by no other method could he accomplish the same amount of work.

A point to which we wish to call the manufacturers' attention, is that in nearly every instance the user of the commercial car has complained that one of the most discouraging features to the use of the automobile has been the inability to get small repair parts promptly, and the fact that the manufacturer does not take the interest that he should, after the car is once sold. Several users, who are very well pleased otherwise, on this account have hesitated to buy more machines. This is a very short sighted policy, and one that is doing much to retard the more general use of the automobile delivery car.

The manufacturer should realize that one pleased user is a great factor towards future sales, and should stand back of the cars fully and give the purchaser all the help possible to get economical and reliable service.

Follow Proven Designs

In designing commercial motor cars the manufacturers should bear in mind the lessons which have been learned by builders of horse-drawn trucks and delivery wagons during the centuries in which these vehicles have been in use. There are a number of features in the old proven designs which experience has proven to be essential. Last month we drew attention to the fact that very few commercial motor cars could be turned around in a small enough space to be used to advantage on narrow city streets. Another feature which is overlooked generally by manufacturers of commercial motor trucks is the fact that the driver's seat must be high enough so that he can see over and around the load at his back. The load of merchandise often reaches to a height that makes it imperative for the driver on the low seat to stop his machine and stand up on his seat to see what is back of his vehicle, and as motor trucks must be operated from the seat this is a feature which is even more necessary than in horse-drawn vehicles, especially when it is necessary to back up to a curb or a doorway.

The driver of a horse-drawn machine can leave his seat and go to the heads of his horses to do this if necessary, but the driver of a motor truck must stay on the seat, where he can operate the levers and steering wheel.

There are a number of points such as these which have been recognized in the building of horse-drawn vehicles and which should not be overlooked by the designers of commercial motor cars.

127 Types of Commercial Motor Cars

The growth of the commercial motor vehicle field is forcibly illustrated by the fact that there were 127 types of commercial motor cars illustrated and described in the "Motor Car Review" in our March number. These were divided into 81 gasoline, 41 electric, and 5 steam, and they ranged in price from $750 to $6000. Every new type of commercial motor car placed on the American market will from now on be illustrated and described in detail in this department of our Journal, and therefore if our readers will take the commercial motor vehicle section of the "Motor Car Review," published in our March number, as a basis and follow this department regularly, they will be always fully posted on every type of commercial motor car on the market.

Government Buys Truck

The Knox Motor Truck Co., Springfield, Mass., recently sold to the U. S. Government one of its Standard Atlas trucks. The government expert who purchased this truck, did so after investigating the many different makes on the market. The truck is to be used at the Springfield Armory.

The company have also recently sold a three ton truck to the King Mfg. Co., Springfield, O., for use in the lumber business; one to Hammond & Sloane, contractors, Brooklyn, N. Y.; one to W. & J. Sloane, carpet dealers, New York City, and one to Cheney Bros., silk manufacturers, Manchester, Conn.

A Correction

In our last issue we stated that the Quaker City Flouring Mills had placed an order for two three-ton trucks with the Electric Vehicle Co. This was a mistake. The order was placed with the Vehicle Equipment Co., Long Island City, N. Y., whose machine had been previously used by the Quaker City Company. The similarity of the names was the cause of the error.

Commercial Vehicle Notes

The Boston fire department has purchased gasoline runabouts for the district chiefs.

Henry Solomon & Son, wholesale grocers of Savannah, Ga., have purchased a 2-ton truck.

An automobile passenger line will probably be put in operation between Cascadia and Albany, Ore., by H. F. McIlwain.

The Eagle Automobile Company, recently incorporated at Rahway, N. J., will build a factory on St. George Ave., that city.

An automobile delivery service will be started with four automobiles in Denver, Col., by Walter Moffat and Edwin Wittleshofer.

The Cumberland Telephone and Telegraph Company, of Nashville, Tenn., are now using six Ford runabouts as trouble wagons.

William O. Sieker, of Milwaukee, Wis., will head a company that will operate a motor car line between Manitowoc, Michicott and Kewaunee, Wis.

The Milwaukee postmaster still is considering the establishment of an automobile service to carry mail from trains and the main post-office to five sub-stations.

Joames Brothers Company, of Green Bay, Wis., have ordered a Reo touring car to be used by their traveling salesmen in covering territory remote from railroads.

An automobile will be put into service between the main post-office in Detroit, Mich., and the new sub-station nearing completion at Lyman Court and Russell Street.

Col. Thomas H. Girling, of Bobbinsdale, Minn., is heading a company which proposes to operate an automobile passenger line from Minneapolis to Anoka and intermediate towns.

The Cuban Motor and Tally-Ho Co. have five big Mack Brothers' buses with stepladder seats, which are devoted mainly to seeing Havana at an average charge of $2 per passenger for a morning or afternoon ride.

Fred O. Brand has resigned his position as manager of the Chicago branch of the Apperson Bros. Automobile Company to become assistant general sales manager of the Autocar Company of Ardmore, Pa.

The Stickney & Poor Spice Company, of Boston, are testing several makes of automobile trucks for the purpose of using them in their delivery service in Boston and vicinity and between Boston and Providence.

The citizens of Watertown, N. Y., are in favor of installing an automobile line instead of a trolley car line on Washington Street, and are circulating a petition for the signatures of those in favor of giving the automobile line a trial.

A fifteen to twenty passenger automobile bus is making round trips daily between Havana and Mariel. The car leaves Hotel Pasaje, Havana, at 7 o'clock every morning, reaching Mariel about 10.30 A. M. The car leaves Mariel at 12.30 P. M., arriving at Havana at 4 P. M. The distance traversed is about 35 miles each way.

Dr. A. James De Nike and Charles Brooks, of Whitehall, Mich., will start an automobile line between that city and Muskegon, Mich., this summer, making three trips each way daily. They will put a ten passenger bus into operation. A line is under consideration between Whitehall and Sylvan Beach, a summer resort.

Deere & Mansur, manufacturers of agricultural implements, Moline, Ill., have placed an order with the John W. Buck Company, of Davenport, Ia., for a 6-ton motor truck, to be built by the Kansas City Motor Car Company. It will have a body extending 18 feet from the driver's seat, and will be able to carry at one load three times as many disc harrows as a horse truck and twice as many corn planters.

The Aero Club of America conducted its second balloon ascension on February 22 at Hillburn, Rockland County, N. Y. Charles Levee was the aeronaut who made the ascension, and again he used his balloon L'Alouette. The balloon started on its journey at 5.40 o'clock in the afternoon, taking a southerly course. It sailed about five miles and descended near Ramsey. The next ascension will be made at West Point.

The Anhauser-Busch Brewing Company, St. Louis, Mo., have recently placed an order with the Pope Motor Car Company, Waverley Department, Indianapolis, for 10 Pope-Waverley Electric one-ton trucks. These trucks will have a form of body designed especially for the brewing company. The Anhauser-Busch Brewing Company are experienced in the use of electrically propelled wagons and trucks, having used them for their delivery and truck service for a number of years. They find them best adapted to their business.

The Knox Company, of Springfield, Mass., recently delivered to the New England Telephone and Telegraph Company a three-ton gasoline truck for use in their construction department for Boston and vicinity. The truck is equipped with a 2-cylinder, 20 horse power engine, with a speed rating about 10 miles per hour. The body of the truck is 12x6 feet. Underneath the rear end and attached to the body is constructed a substantial double winch, with drawing drums extending out from either side. This winch is operated through a chain drive from the engine and controlled by a clutch. The winch is used for drawing both light and heavy cables in and out of underground conduits.

Andrew Redmond of Harrisburg, Pa., a carriage builder, has had a motor truck built from a special design by the Pope Motor Car Company, at their Indianapolis factory. The truck has a capacity of one ton. The wheel base is 96 inches, and the tread, 62 inches. The wheels are of the artillery type, fitted with 30 by 3 solid rubber tires. The two electric motors with which the truck is equipped hang from the body in front of the rear axle. The controller is of the Westinghouse make and there is one expansion brake on each rear hub. The battery equipment consists of 42-11 M. V. exide cells. The length of the body over all is 13 feet and the truck has a clear carrying space of ten by six feet.

The Medical Corps of the U. S. Army has recently tested out in the streets of Washington an automobile ambulance; the chassis is of the regular steam touring car form and has been changed only by lengthening the wheel base 10 inches, making it 124 inches. Pneumatic tires are fitted and an ambulance body that has an arrangement for swinging four patients longitudinally, or using seats on one or both sides in case the patients are able to sit up. After completion the ambulance was tried in the vicinity of Cleveland for some time and then run to Youngstown, Ohio, and from there it was shipped to Washington, where it has thoroughly been tested out in trips to Baltimore and Fort Meyer, where it was run over plowed ground, etc.

Experience of Commercial Motor Car Users and Cost of Operation

Have used Motor Delivery Six Years and would not think of returning to Horses

Gorham & Co., Silversmiths, 5th Ave. and 36th St., N. Y., have used electric motor cars for delivery for the past six years, having placed the first five cars in operation in 1899. The Gorham Co.'s experience has been exceptional, from the fact that the machines have given good satisfaction from the first.

The Gorham Co. have now in daily operation 15 machines, three of which are large 2-ton trucks, which are used to handle the heavy freight. The Gorham Co. have an up-to-date garage and repair shop, with facilities for building up and forming their own batteries and for making any needed repairs, and pursue the policy of keeping the machines in A No. 1 condition at all times.

Mr. Demmitt, the superintendent, explained that no machines were allowed to go out unless in absolutely first class condition, and that he believed in the old adage, "That a stitch in time saves nine," a fact that is responsible in no small degree for the splendid service that the machines have given.

The original five machines, Riker electrics, are still doing daily service, having recently been overhauled and the batteries underslung. The batteries were formerly in the body and in addition to taking up considerable room, the weight being high, made the machine hard on tires. Mr. Demmitt said: since the change had been made, the machines had shown an efficiency equal to some of the latest machines that they had installed. As an illustration of the excellent care these machines have had, one would not think that tney were more than two years old at the most, as they are still in first class condition, both as to appearance and as to mechanism. As regards the service that tires had given, Mr. Demmitt said, that they were very well pleased with results attained and that they have had several machines that ran for eighteen months, without giving a minute's trouble, with the tires. As regards to the expense of operating, compared with the horse drawn delivery, he said, that it was very hard to make a comparison; that one machine would do considerable more work than a horse drawn delivery, and that when they were using horses, that they bought the best horses and were compelled to keep quite a few in reserve, in order to alternate the work on each, and even then, the average life of the horse was only about a year in their service, while on the other hand, the automobile if kept in proper condition would keep on doing satisfactory service year after year. He said that while he was not in position to give data regarding the cost to operate, that he would say, that they considered the automobile a very good investment and in 1901 had added two machines to the original five, three more in 1902 and the balance in 1904 and 1905.

Mr. Demmitt, when asked as to the future of the electric automobile for delivery service, said that there was no question on this point, and that any concerns that would go into the matter intelligently, and use the same sound business judgment in the purchase of cars, care and organization of this department as they would in the other departments of their business, that they would undoubtedly make it a success.

His experience would indicate that the present cars are too heavy for the carrying capacity, and is pleased to note that some of the latest machines were much improved in this respect.

The above successful experience of the Gorham Co. with wagons built years ago, and not to be compared with the latest improved cars, contrasted with the experience of some of the companies whose equipment has been more modern, and yet whose service has been unreliable and expensive, again brings up the point that success depends a great deal upon the care taking, and the intelligent handling of the machines.

A Garage and Repair Service at a Stipulated Sum Per Month

The Regal Shoe Co., corner Broadway and 10th St., New York, are using a Cadillac light delivery wagon for the delivery of repaired shoes from their various stores in New York and Brooklyn. Mr. Sampson, the manager explained that it would be impossible for them to do this work satisfactorily with horses and wagons, on account of territory covered, and that the machine made daily three trips, one from the Brooklyn store and the other two trips from the New York stores.

Mr. Sampson also said "That the machine had proven very satisfactory and that they were much pleased with its performance, and were contemplating the installing of another machine in the near future."

In regard to the cost of operation, Mr. Sampson said "That the car had proven cheaper than wagons and horses, as it would require several horse drawn wagons to do the same work." An uptown garage keeps the car in good repair, furnishes the chauffeur, oil, gasoline and stores and cleans the machine, and in case the car is not in condition to go out, to furnish another, so that the delivery is not held up in any way. For this service he pays $165.00 a month. This service he considers cheaper than to care for and to store their own machine, and also more satisfactory, as it relieves them of any annoyances incident to the use of the car.

The above interview with Mr. Sampson brought to the writer's notice for the first time a repair and garage service for a stipulated charge per month. The idea is a good one, and one that the garage owner ought to make profitable and at the same time save the user of the commercial car money, especially the small user, as it stands to reason that the repairs can be made by the owner of a well equipped garage where a large number of cars are taken care of, much cheaper than is possible for the user of one or two machines.

Are Buying More Cars After Eight Years of Use

James Hearn & Sons, large dpartment store, 14th St., New York, were one of the earliest users of the automobile for delivery purposes, having placed their first machine in operation about eight years ago. This concern has now in daily operation twenty-nine machines, of which twenty-one are electric of different makes and seven Daimler gasoline wagons.

The experience of the Hearn Co. is valuable as it shows without a doubt the machines are becoming more practical every year, and that each style of machine has its advantages. Without hesitation they state that for their class of delivery the best car for city delivery is the electric, and for long trips to outlying points, the gasoline car.

The electric car for city delivery was more reliable, could get under way more quickly, was easier to handle in congested districts, and that the electric car could be handled by an inexperienced man, while on the other hand the gasoline car had proven cheaper to operate, and in the hands of a competent driver had given very satisfactory service and was capable of making very long trips, making regular deliveries as far away as Coney Island.

The most objectionable feature, they experienced in the use of the gasoline car was "the securing of competent drivers," as a competent man who could care for and operate a gasoline car was usually averse to doing delivering, and could usually get more salary as a driver of a pleasure car than this class of work would justify.

The Hearn Co. have their own garage and take care of and repair their own machines. The cars are overhauled once a year, tires being replaced if needed, machinery put in first class condition and the cars repainted.

The Hearn Co. electric equipment embraces several different makes and types of cars, and they pursue the policy with the electric machines, rather than to keep the batteries repaired up and in condition to do the maximum number of miles on one charge of changing the route for the different machines, sending the cars that are capable of doing a large number of miles on one charge on the long trips, the other machines on the shorter trips. This policy is adhered to until a machine will not make more than five miles on one charge. The battery is then taken out and a new one installed. The company claims that this plan enables them to get all the mileage possible out of the batteries, and that they have been able to so arrange their schedule of trips that the plan works out very satisfactorily.

The first few years the operating expense had been more than it should have been, due to ignorance in handling and to not having the proper facilities for the care and handling of the machines. The maintenance expenses for the last year was on an average $100.00 more for each automobile than for two horses and wagons, but as they considered that two automobiles would do as much work as three teams, and that the advertising benefit as considerable, and that the automobile had a field of operation of its own in covering distant points, they considered the machines a very good investment, and had recently added several new cars of the latest type, and that they expected from their accumulated experience and the improvements that have been made, to be able to operate these new machines at a less expense each than a two horse team.

More Work at the Same Cost

Paul Westphal, dealer in barbers' supplies, at 306 W. 35th St., New York, has used a Knox air-cooled gasoline delivery car for the past year, for delivering barbers' supplies in and about New York City.

Mr. Westphal said that the car has proved more satisfactory than horses, as their delivering was over a large radius, and they were able to do this work in much less time than formerly. Tires so far had not cost him a penny, and were still in good condition.

The expense of operating compared with horses, Mr. Westphal said, had been about the same, but that he had been able to accomplish a great deal more work with the automobile.

Mr. Westphal also explained that the expense had been higher than it should, as he had arranged to store and care for the machine on the premises, and he had been compelled to pay a higher insurance rate, which was charged against the machine, and for this reason, where only one machine was used, it would be cheaper to store it at a garage.

Electric Wagons Replace Horses

The Aiken Sons & Co., large department store, at the corner of Broadway and 18th St., New York, have installed five electric delivery wagons in their delivery service. These wagons are of the Lansden Co.'s make, have entirely replaced double the number of horse drawn wagons, which were formerly required to do this work. Mr. Graham, the delivery manager of this concern, said that they had not had the cars in operation long enough to give out figures regarding the cost to operate, but sincerely believed that the cost would be less than with horses and wagons. The Aiken Co. have gone into the delivery proposition very thoroughly, and have established their own garage for the storage and care of the cars. The fact that the Aiken Sons & Co. had one machine in use for a long time before they decided to replace the horses entirely is sufficient evidence in itself that they were pleased with the car's performance and knew what to expect in the way of cost.

The Automobile in a Class by Itself for the Delivery of Pianos

The Aeolian Co., 34th St. and 5th Ave., New York City, are using five machines for the delivering of pianos in and about New York City.

The Aeolian Co.'s equipment consists of four Knox air-cooled gasoline cars and one Vehicle Co.'s electric truck.

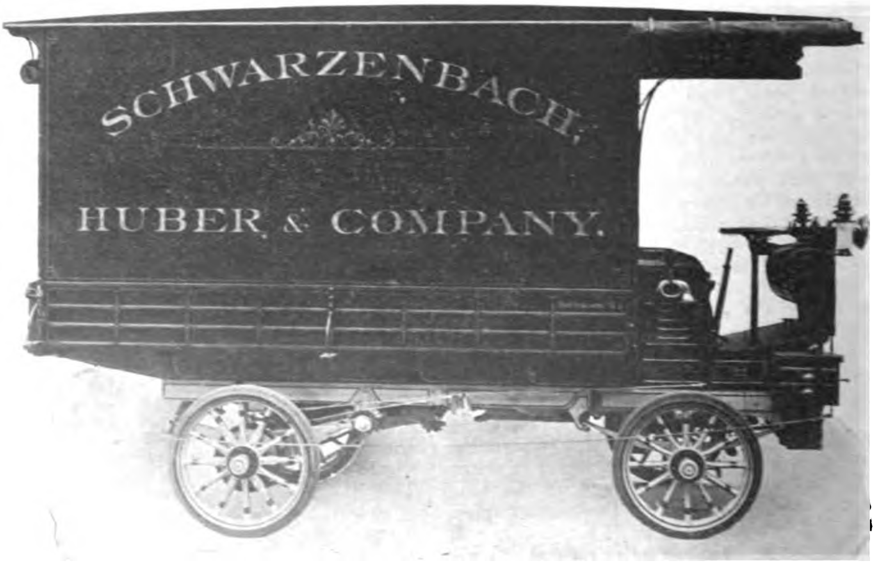
Asked as to the practicability of the automobile for this class of delivery, Mr. Wirth, of the Aeolian Co., replied: "Can't be beat, and is in a class by itself." Mr. Wirth also said that both the gasoline and the electric had their advantages, and both were entirely satisfactory. For city delivery, he preferred the electric, as he had been able to run it far cheaper than the gasoline cars, and it could be operated by an inexperienced man. But for long deliveries, that the gasoline car had the advantage, and that they had made deliveries with the gasoline cars 70 and 80 miles distant from New York City, and had on several different occasions delivered a piano 70 miles out and returned the same day, making a total mileage of 140 miles.

The Aeolian Co. have their own garage, with a complete equipment for making their own repairs, an automatic charging plant for charging the electric machine, and pursue the policy of keeping the machines in A1 condition at all times.

Asked as to the advantages of the automobile, and what caused them the most trouble, Mr. Wirth said that structural weakness of axles and springs had given them the most trouble, but said that perhaps this was due to the heavy work and hard usage the machines were subjected to, and that on the whole they had had very little trouble. For example, the radius rods on the axles had proved too light on one of the machines, and they at once put on heavier ones, and when any part showed evidence of weakness or wear, it was at once replaced, and by constant care and vigilance that they were able to keep the machines running every day and to get a great amount of work out of them. On the day before Christmas last the five motor cars delivered eighty pianos.

The operating expenses, as compared with delivery by horses and wagons, Mr. Wirth said, as they had only had the machines in operation about a year, and had gone to considerable expense to equip, care and store them, he was not in a position to give an accurate comparison. He also said that the comparative cost was very hard to arrive at, as on one delivery the automobile would do the work at a great deal less cost than horses. As, for instance, in the case of a long delivery of 140 miles in one day. If this trip had been made with horses, it would have taken two teams and would have required one day to make the trip and one to come back, so that in this instance the automobile did the work of two teams and in half the time, and for this class of delivery the automobile was very much superior to horses, as the life of a horse was very short in a service of this kind.

Asked as to what, in his opinion, would make the automobile more practical, Mr. Wirth suggested that to make motor cars more practical small details of construction should be given more attention, and that better materials should be used throughout, for if this was done, the upkeep cost would be greatly reduced.



PACKARD TRUCK WITH LARGE DELIVERY BODY.

The above illustration is of a Packard 3000-pound Truck, which has just been sold by the New York agent of the Packard Co. to Schwartensback, Huber & Co., West Hoboken, N. J. This truck is fitted with specially large body, and should prove an excellent machine for the delivery of bulky merchandise. As several of the large department stores' delivery managers have expressed the need for a vehicle of this type, this machine should prove a splendid seller.

Cowperthwaits Well Pleased

Cowperthwaite & Son, dealers in furniture, 121st St. and 3rd Ave., New York City, have used a Knox air-cooled gasoline delivery car for the delivery of furniture for the past year, and say that the car has given very good service and that they are well pleased with its performance.

They say, however, that it has no advantages over horses for short hauls, but for covering a large territory the motor car had the advantage, as it was able to make deliveries over a large territory in much less time than with horses.

As regards to the expense, they were not in position to give out figures showing the cost of operating, but they had looked into the item for their own satisfaction, and that the cost of doing the work was about the same, and that they considered that in addition to covering a larger territory, the car had an advantage on icy or slippery streets, when it was extremely hard to make deliveries with horses, which condition did not seem to interfere with the automobile.

They have had some ignition troubles in wet weather, and the car has been held up a few times from this cause, but on the whole it had proved quite satisfactory and they have lost but very little time from the car being out of commission.

Beating the Railroads

The Knox Automobile Co., Springfield, Mass., transported their entire Madison Square Garden exhibit from Springfield to New York City by their own power. The pleasure cars were loaded on the trucks and brought through without trouble or mishap. The distance is 160 miles and the roads were muddy and slippery. The distance was covered in 18 hours. This is an unusually good run considering the fact that the trucks were geared to only 10 miles per hour. This run not only saved the Knox Co. the expense of transportation, but served to demonstrate the practicability of the wagons, and is a splendid tribute to the reliability and excellence of these machines.

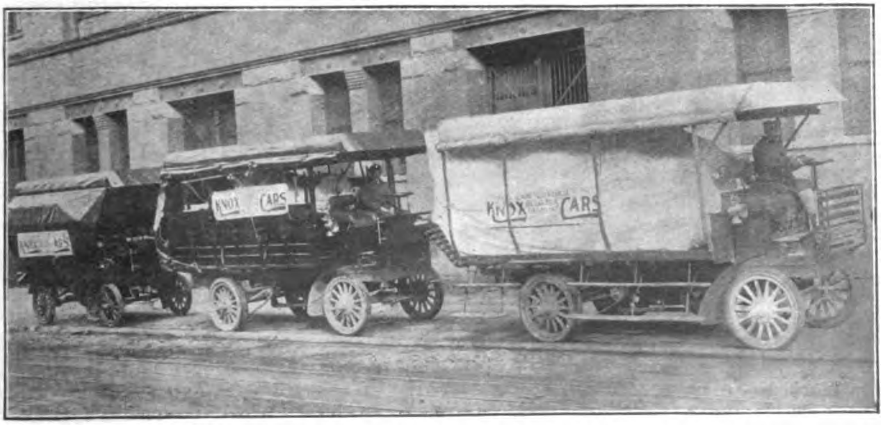
Two Years' Satisfactory Service

The Bethlehem Silk Co., Bethlehem, Pa., have been operating a Knox air-cooled truck in their freight service for the past two years, and are well pleased with the service rendered. The company handle all the freight incident to their business with this one truck, and explained that before the truck was installed that it required two and sometimes three teams to do this same work, depending upon the quantities in which the materials arrived.

The most advantageous feature in the use of the automobile they considered "the very prompt service rendered." Their experience suggested that "the use of better castings and forging materials" would make automobiles more desirable. The Bethlehem Co. consider that the automobile delivery is more satisfactory and cheaper for their work than horses, and furnished us with the following cost sheet showing the cost per mile to operate this wagon for a period of one year ending Feb. 1, 1906. One very noticeable item on this cost sheet is the fact that, although this is the second year that the machine has been in operation, the tire upkeep has not cost a penny.

The following table gives the Bethlehem Silk Co.'s figures for operating a Knox truck for the year ending Feb. 1, 1906:

	Cost per mile.
Tire upkeep	.00000
Repair wages	.01402
Repair parts	.01726
Painting	.01020
Lubricants and kerosene	.00092
Insurance and license	.00742
5018 gals. of gasoline and chauffeur's wages at $9 per week	.02546
Total cost of operating per mile	.07528

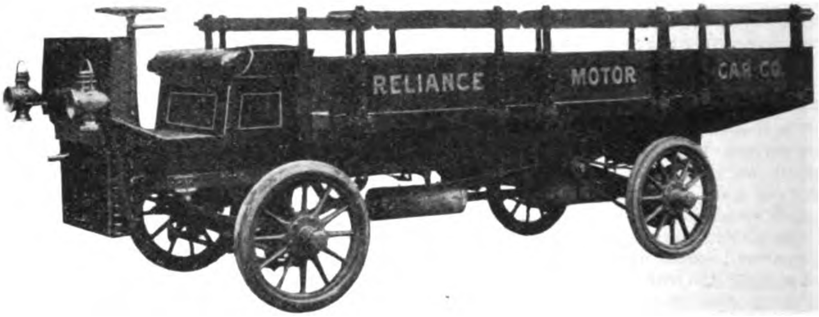


Knox commercial cars enroute from Springfield, Mass., to New York, loaded with Knox Madison Square Garden exhibit. A striking illustration of the possibilities of the modern commercial wagon.

The Reliance Trucks and Delivery Wagons

HUGH DOLNAR.

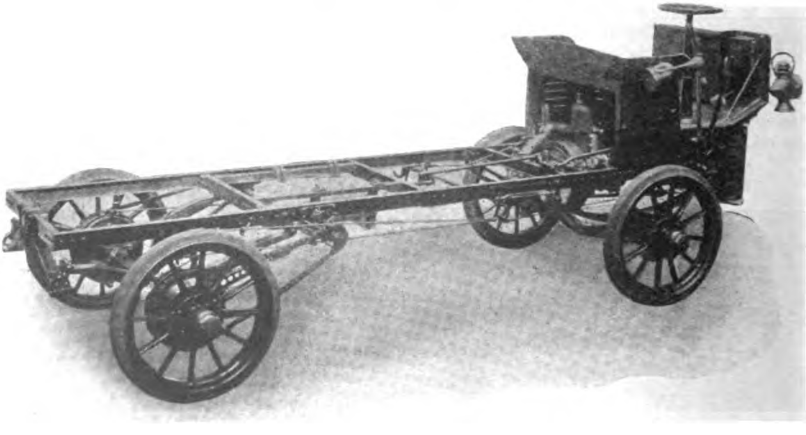
The Reliance Motor Car Company, Detroit, Mich., U. S. A., offers for the season of 1906 one model of 5-passenger touring car, motor a pair of 5¼x5½ inch horizontal opposed cylinders, one three-ton truck, motor a pair of vertical 2-cycle water cooled 5⅛x5 inch cylinders, and one delivery wagon, motor a pair of vertical 2-cycle water cooled cylinders, 1500 pounds paying load.



Reliance 3-ton truck; wheel base 110 in., gauge 56 in., centre to centre of wheels; tires Firestone, 32x4 in., motor a pair of vertical, water-cooled 5⅛x5 in. 2-cycle cylinders, nominal 28 H. P., sliding gear speed change three forward speeds and a reverse to counter shaft, side chains to rear wheels; brakes, external and internal on the rear wheel hubs, air space between the external and internal brake drums. Clear length of truck platform for paying load 156 in.; total length of chassis frame 157 in., truck length 200 in. over all; weight, with large body, 3500 pounds. Price, $2500, including tools and choice of two standard styles of bodies; 9 to 1 high speed reduction.

These new Reliance Commercial cars were designed by Mr. Howard A. Wilcox, whose 2-cycle motor driven touring car was described in the Journal of July 1905.

The Reliance Company also offer a 2-ton truck, same chassis and same motor, 6 to 1 reduction from motor to driving wheels, about the same weight, and same price, $2500.00, as the 3-ton truck, but higher speed. The maximum speed of the 3-ton truck, loaded, is 10 to 12 miles per hour. The maximum speed of the 2-ton truck, loaded, is 15 miles per hour. Special styles of bodies open or covered, will be fitted to order.



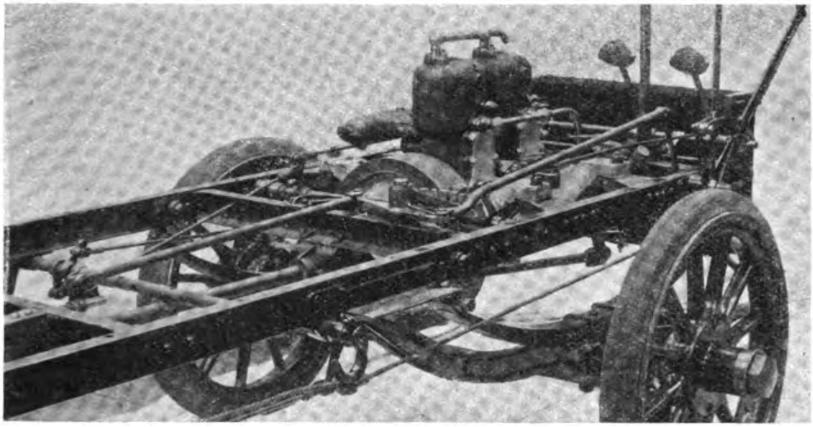
Reliance Motor Truck Chassis. Chassis frame ov shows channel steel chassis frame. The regular cha tion, 3-16 thick, 4⅛ in. greatest depth, top and bot over all; cross girts, pressed steel, channel section. Sub-frame for motor 22 in. wide over all, sub-frame 1½ in. wide over all, uniform depth 2⅝ in., chassis f of driver's seat, are removable to expose the motor.

er all 157 in. This illustration from first truck ssis frame will have pressed steel side, channel sec- tom members 1 9-16 in. clear depth and 1⅝ wide 3-16 stock, 3¾ in. depth by 1⅝ in. over all width. members, pressed steel, channel section, 3-16 stock, rame 35½ in. wide over all; panels, front and sides

REAR AXLE.

This is a steel forging, 2 inches square, straight, rear wheels on Timken roller bearings. The brake drums and sprockets are crucible steel integral castings. The two brake drums, integral with sprockets, are bolted to finished flanges integral with the wheel hubs, and have an annular air cooling space 7-16 wide between them. The brake drum diameters are 13⅛ external, and 11¼ inches internal, outside face 2½ inches, inside face 3 inches. The outside brake band is steel, flexible, lined with Gandy belting, 3-hole lever applied, ordinary construction. The internal brake shoe is an integral grey iron ring, hung at the top open ends on the cam-rock-shaft (see illustration). This is claimed as an original Reliance design. The sprocket has 36 cut teeth for 1¼ inch pitch chain, ⅝ dia. rollers by ⅝ wide. The teeth are shaped to prevent chain riding. The internal brake is pedal applied, and is the ordinary brake. The outer brake band is lever applied, ratchet retained.

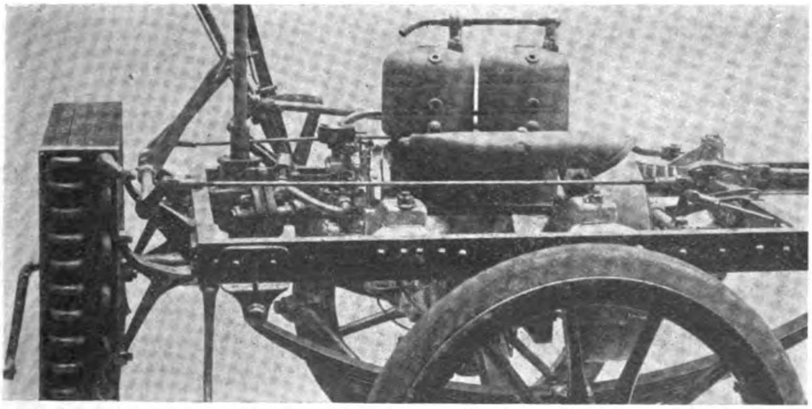
The brake rocker bracket is a two-piece steel casting pinched on the square axle, with a disk to cover the internal brake drum and a hub to take the rocker, and has an arm with a hub to take the exterior brake band suspension stud.



Reliance three-ton truck, front of chassis, right side oblique, showing motor, control, and construction of the two independent brake rockers.

The brake drums and sprocket crucible steel casting is machined, to fit the machined integral hub flange to which it is applied. The rear spring pads are in two pieces, also pinched on the square rear axle, which stands with its corners vertical and horizontal.

The brake rocker bracket has a finished flanged seat, turned after the bracket is pinched on the axle, on the rear axle centres to take the strut eye; the front strut-end is globed, threaded into the split strut body end, and is pinching screw retained. The ball is seated in a split globed bearing integral with the counter shaft bearing bracket.



Reliance three-ton motor truck, front, left hand elevation. Exhaust side of motor.

The front axle is an I-section steel forging, dropped in the illustrations, but will be straight, axle 3 in. deep, Timken construction, Timken stub axles and front wheel bearings.

The rear springs is a 3-spring platform, side members 44x2½ in., 8 leaves. The cross spring is 35x2½ in., 8 leaves, sides perched 2 in. to rear of middle.

The front springs are half elliptics, 44x2½ in., 10 leaves, perched in middle, buttons in front, shackles in rear.

THE DRIVE.

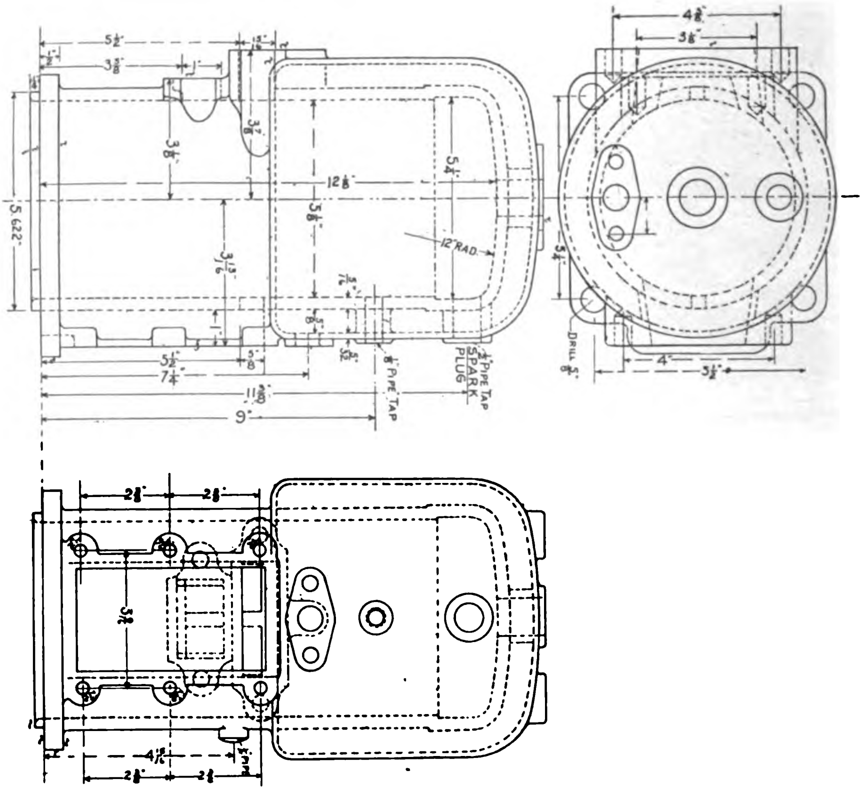
The clutch is a 12-deg. angle cone, aluminum casting, 14 in. large dia., faced with leather, pegged on with ⅛ square wooden pegs, also copper rivetted, pegs driven in drilled holes ⅛ dia. The wooden pegs prevent a too sudden clutch engagement. The clutch is automatically coiled spring engaged with its coacting female member formed in the flywheel rim. The front line shaft from the clutch cone to the change gear box is 34½ in. long, C. to C. of its universal joints.

THE CHANGE GEAR.

The sliding gear gives 3 forward speeds and a reverse, the line shaft and side shaft are in the same horizontal plane, all on plain bearings, all gear teeth hardened, including the bevel gears to the counter shaft. The change gear box and cover are aluminum, with large aluminum hand hole covers on top, ordinary construction. The outer bearings for the counter shaft are 8-inch Hyatt roller bearings in steel sleeves which are integral with one-half of the globe strut end bearings, sprockets on tapers, with Woodruff keys and hexagon nuts. The inner ends of the counter shafts are on Timken roller bearings. The balance gear is bevel, 3 pinions, all hardened.

THE MOTOR.

Details of the cylinders and pistons of this two-cylinder vertical two-cycle water-cooled motor are given elsewhere in this story. The crank shaft has wrists which are 1¾ in. dia., and 1⅝ dia. journals, three, 3 in. long at ends and 4 in. long in the middle. At the middle of each journal is a flange about ¼ square, to prevent blowing through. The crank shaft is in plain babbit bearings poured in grey iron half boxes. The piston rings, 7 in each piston, are elsewhere described. The flywheel is fixed to an integral crank shaft flange with 6 bolts, ½ in. dia., driven in reamed holes, and two ½ in. dia. pins, straight and driven. The piston pins are 1⅜ dia., with ¾ holes through them, are hardened and ground, fixed in piston by set screws, and work in hard bronze bushes in the top rod-ends, which are split and pinched on the bushes. The lower rod ends are full marine type, with babbitted bronze half boxes, finished outside to fit the finished rod ends, for ready replacement. The rod bodies are H-section, crucible steel castings, and the rods are 9¼ in. centre to centre. The crank box filling disks, applied to the crank arms, are grey iron castings cored out to form counter balancing weights. The pistons are not filled. The crank box clearance is small as may be.



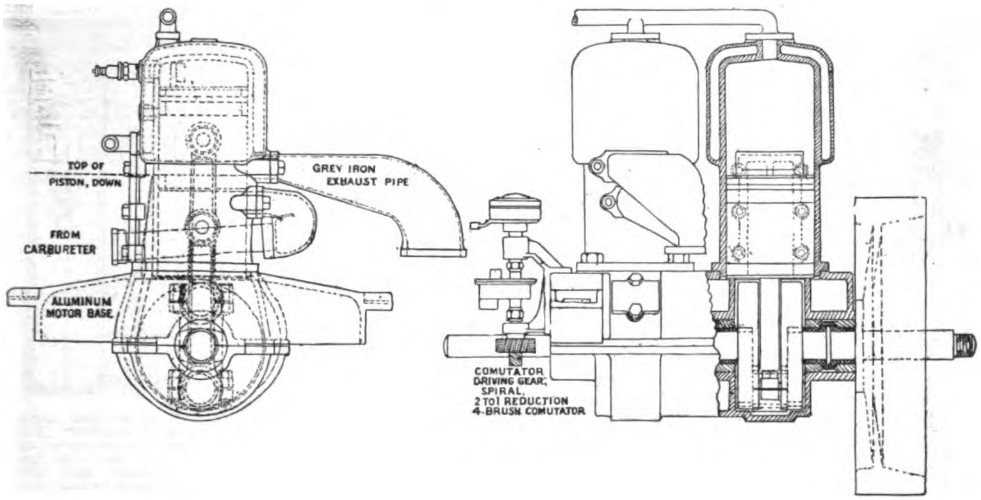
Reliance three-ton truck, two-cycle cylinder, cylinders 5⅛ bore, pistons 5 in. stroke, compression chamber above top of high piston 1⅛ in. Ports, lower line of cylinder ports flush with top of low piston; intake port opposite exhaust port; both ports bridged; intake port ⅝, exhaust port 15-16, port bridges ⅜ wide; intake port, including bridge, about 3 in. circumferential length equal to about 2⅛ in. clear port length; exhaust port circumferential length, about 3½ in., clear length about 3⅛ in.; crank box intake is 15-16 wide up and down by 1¾ in. circumferential length with bridge, 1⅜ in. clear length; the lower end of the high piston is flush with the top line of the crank box intake port. The cylinders are cast from French iron. Water jacket bottom line is 4⅛ below top line of high piston. The spark plugs are horizontal, a little above the middle of the compress ion chamber length.

COMMUTATOR GEARS.

The commutator has four brushes and is driven at half the crank shaft speed by a spiral gear from the crank shaft. This reduces the commutator speed and wear, and also the spark regulation angle and travel of the wiring, by one-half from that with only two commutator brushes, commutator to run even turns with crank shaft. This makes the ordinary four-cylinder Lacoste commutator suitable for a two-cylinder two-cycle motor, and the four brushes give a much better balanced and wearing action of the commutator shell itself than where only two brushes are used.

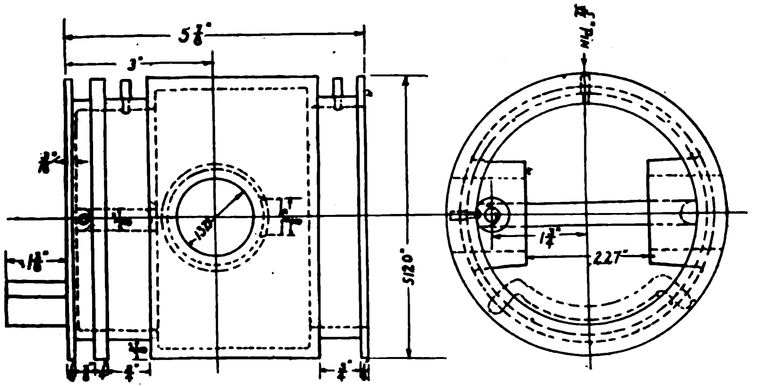
CONTROL.

The steering is by a 16 in. hand wheel, shaft integral with worm, and the worm-gear sector integral with the steering arm, gearing cased, 2½ turns of the steering wheel to full sweep of front wheels, worm and sector hardened and ground.



Reliance three-ton truck, motor assembly, end, and side in partial section. The cylinders are 5⅛x5 in., top of cylinder slightly dome-shaped; from top of piston up, to top of cylinder inside 1⅝ in. The compression chamber will be about 5 3-16 in. dia., finished combustion chamber interior.

The spark and throttle control are shown here as on top of the wheel, but will be changed to independent outside rockers, parallel to, and on opposite sides of, the steering column, or a rocker and rocker sleeve concentric, with hand levers on top, and direct connections below, without bell cranks.



Reliance three-ton truck. Motor piston. The top groove takes a single eccentric snap ring, 45 deg. angle lap. The two ¾ wide grooves top and bottom take the ordinary three-ring steam piston packing; the inside ring, ¾ wide, is eccentric, about 3-16 thick side and ⅛ thin side. The two outer rings of each set are ⅜ wide by ⅛ thick, all cut 45 deg. angle, all rings pinned in place, and all ground all over, inside and outside and edges. The pistons are cylindrical, ground to 5.12 in., 5-1000 small. The cylinders are reamed with expanding reamers, kept close to size, 5⅛ in. The 1⅝ high deflector, shown here as integral, will be applied by rivetting to the piston, so that the piston heads can be squared off in the lathe. The pistons are cast from French grey iron, which finishes smooth, and offers great resistance to wear.

There are two large pedals on the footboard, the right hand one for clutch disengagement only.

The left hand pedal first disengages the clutch and then applies the ordinary internal rear hub brakes.

There are two vertical levers outside the car, the outer one, ratchet retained, is pulled to the rear to first disengage the clutch and then apply the emergency rear-hub exterior brake-bands.

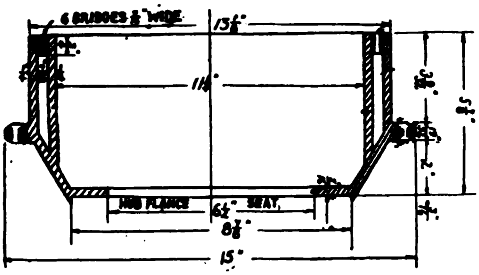
The inside vertical lever shifts the gear, is locked so long as the clutch is engaged, and is released by disengaging the clutch, which cannot be re-engaged until after some full engagement of the speed change gears is effected. The speed change gear lever stands at extreme forward position for high gear, and at extreme rear for the reverse.

LUBRICATION.

This is by a gear driven mechanical oiler, with four force pumps independently adjusted to force oil to four oil leads, two of which go to the cylinders at points covered always by the pistons. The cylinders are not grooved. This point is in the plane of piston pin travel, and the injected oil goes through a cross hole in the pin to the rod bush bearing.

The other two oil leads go to the outsides of the outside crank arm disks, and open into shallow grooves in the sides of the disks, inner groove wall concentric and plain, outer wall dovetailed and eccentric so as to both retain the oil and throw it outward to the largest radius of the dovetailed eccentric oil groove, which registers with an oblique oil hole reaching through the wrist to the inside of the rod end bearing. The oil lead reaches about ⅛ into the depth of the groove, which is about 3-16 total.

The Reliance two-cycle motor is spoken of as a "6-port" engine. It has the usual three ports, two opening into the cylinder, and one into the crank box, with the usual form and location of side pipe from the crank box to the cylinder intake port, but the three ports are each bridged in the middle, making 6 port openings as all, hence the "6-port" designation.

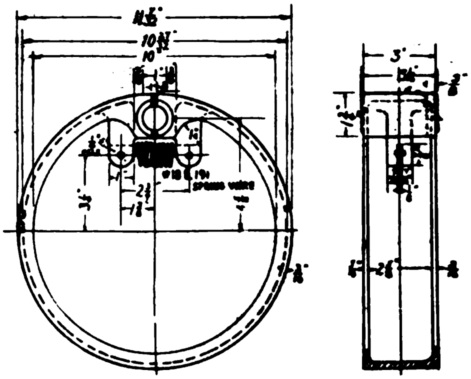


Reliance three-ton truck, external and internal brake drums, with air space between the drums. The drums are tied together at the outer edge by 6 bridges, 7-16 wide by ¾ deep. This is an integral crucible steel casting, finished brake drums external and internal, and finished seat to take the integral hub flange. The sprocket teeth are cut, and this piece makes a very substantial construction. The air space is important as interposing a bad heat conductor between the ordinary internal brake drum and the emergency exterior brake drum.

Each piston has three packing ring grooves, see caption of piston illustration.

BRAKE EQUALIZING.

The two independent sets of rear hub brakes, one pedal applied and the other set applied by the emergency brake lever, are both equalized, the one set by an evener, and the other set by the well known device of a wire cable loop carried through a hollow rocker with grooved arms.



Reliance three-ton truck, internal brake shoe, integral grey iron casting, cam rock shaft applied. The brake shoe is cut apart on top, and is also bored on top to hang free on the brake rocker, and has two ears inside to take the ends of a coiled shoe collapsing spring. The shoe hangs free when closed, and expands freely in all directions to obtain uniform contact with the interior drum surface.

9800 Miles in less than a Year

Ostermoor & Co., manufacturers of mattresses, at 166 Elizabeth St., New York, have been using a Knox air-cooled delivery wagon for about one year, and covered from March 1st, 1905, to Feb. 15th, 1906, 9800 miles. The Ostermoor Co. use the wagon for the delivery of mattresses and cushions in and about New York City; the average load handled is about 1500 lbs. The company state that the performance of the car has been very satisfactory and that its use has enabled them to cover more territory, and in less time, than was possible with horses and wagons, and that the truck easily does as much work as could be done with two horse drawn wagons. The Ostermoor Co. furnished us with the following figures, showing the cost to operate this truck:

Average cost per month for gasoline and oil	$20.00
Average cost per month for chauffeur and helper	84.00
Average cost per month for storage and washing	15.00
Average cost per month for repairs and repair parts	8.00
Total cost per month to operate	$127.00

The above figures are interesting and prove without a doubt that automobile delivery is a paying proposition. The Ostermoor Co. were not in a position to give us figures regarding the cost to do this same work with horses, but it goes without saying that two teams and wagons could not be maintained at anywhere near the above figures.

To Managers of Delivery and Transportation Systems

We will make a careful study of your conditions and submit recommendations for improving your service—**without cost to you.**

If you approve of our recommendations we will contract to furnish you a complete equipment—gasoline, electric or steam, exactly suited to your needs. May we send you information blank?

THE COMMERCIAL MOTORCAR CO.

No. 4 East 42nd Street New York City

The "American Truck," 3 to 4 Tons

HUGH DOLNAR.

The American Motor Truck Co., Lockport, New York, U. S. A., is now showing a new model truck, 3 to 4 tons paying load, which is here first illustrated and described. This company placed a 2-ton truck on the road in June, 1905, which has been in constant and satisfactory service since that date, and has now prepared designs for a full line of heavy trucks from 2 tons to 10 tons paying load capacity.

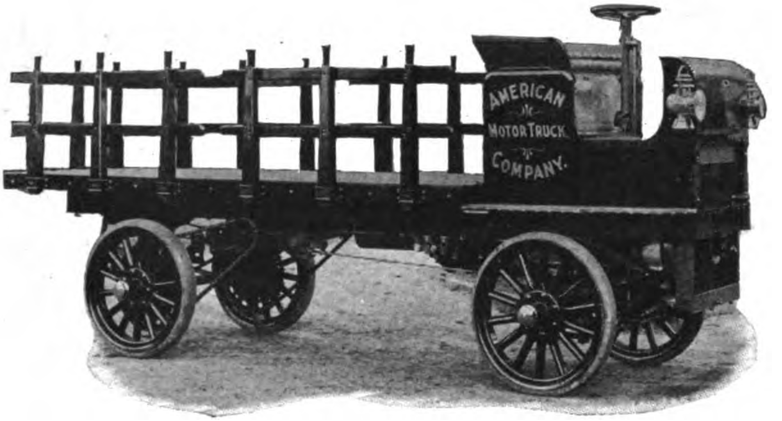


Fig. 1. The American Truck, 3 to 4 tons paying load, 4-cylinder, 5x6 engine, 30-36 H. P., low speed, low compression; front tires 36x4 Firestone, rear tires 36x5 Firestone; planetary speed change, multiple disk high speed clutch; weight 6340 lbs.; price $3750.

The American truck, 3 to 4 tons paying load, wheel base is 118 ins., gauge 54½ ins., tires solid side-wire Firestone, 36x4 ins. front, 36x5 ins. rear. Motor, 4 vertical water-cooled 4-cycle cylinders, 5 in. bore by 6 in. stroke. Planetary speed change two forward speeds and a reverse, multiple disk high speed clutch, fiber-lined friction bands, bevel gear to counter-shaft and Whitney chains, 1¼x¾, with ¾ rollers to rear wheels. Internal drum brakes on rear wheels. Weight of car, as shown in illustration, tanks filled, 6340 lbs., scale price, $3750, including horn, tools, and three oil lamps.

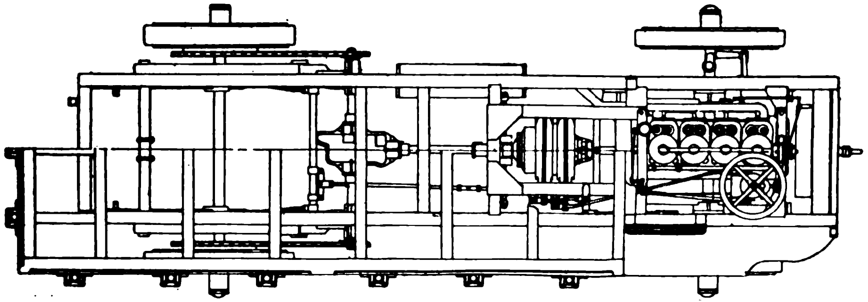


Fig. 2. American motor truck chassis plan.

NOTABLE FEATURES.

The front springs are ¾ elliptics, with a platform spring in the rear. The motor is under the driver's platform in front, 4 vertical cylinders; fuel tank 18 gallons, is under the driver's seat. By removing four bolts and disconnecting the gasoline supply the whole driver's footboard and seat with the fuel tank may be removed, leaving the motor wholly exposed. The planetary change gear is adopted as best for use by unskilled drivers, and is made of ample strength, cased in oil-tight by novel grey iron spring pressed packing rings, and is fitted with a cam-lever and sliding cone actuated multiple disk high speed clutch. The planetary brake bands are fiber-lined, as being less liable to accidental injury than metal to metal, and the soft machine steel planetary gears are 6 d. p. x 2½ in. face. The multiple disk clutch is 6 steel disks, 10 ins. effective diameter by 1-16 thick, faced with fiber 3-16 thick held with copper rivets. The packing rings make the gear casing oil-tight and dust-proof, and the gearing runs in oil, and cannot damage itself, cannot be mishandled, is of ample strength to carry the full power of the motor, and is well adapted for use in unskilled hands. The bevel pinion and gear to the counter shaft are hardened, as are the countershaft sprockets.

The most notable feature of the motor is the diagonal division of the crank case, left hand portion removable, so as to fully expose the crank-shaft and rod ends, and permit the removal of the rods and pistons without disturbing the cylinders or cam shaft.

THE AXLES.

The rear axle is 2½ in. square hand-forged steel bar, of ample strength for its heavy service. All four wheels are on Timken roller bearings.

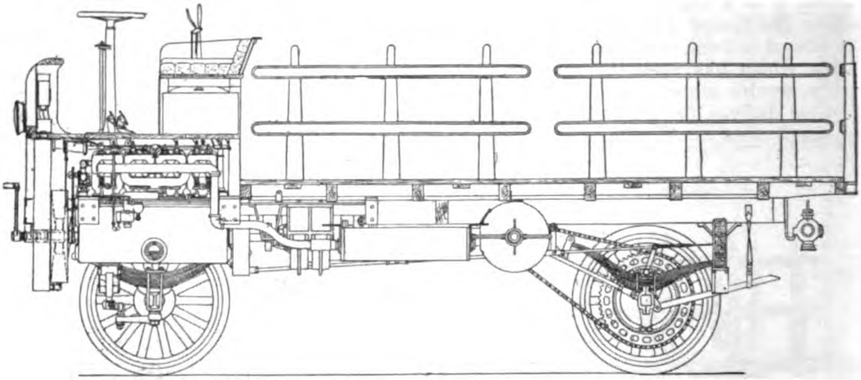


Fig. 3. American motor truck side elevation.

The front axle is a drop-forged steel construction I-section, 2½x4 ins., the forks are 6 ins. opening and the soft machine steel pins are 1¼ diameter, with two hard steel washers to carry the load. The stub axles are 2 11-16 ins. large diameter.

THE SPRINGS AND STRUTS.

The front ¾ elliptic springs are 42 ins. long, 12 leaves, and the rear side springs are 38 ins. long, 12 leaves, and the cross-spring is 38 ins. long, also 12 leaves, all springs 2½ ins. wide.

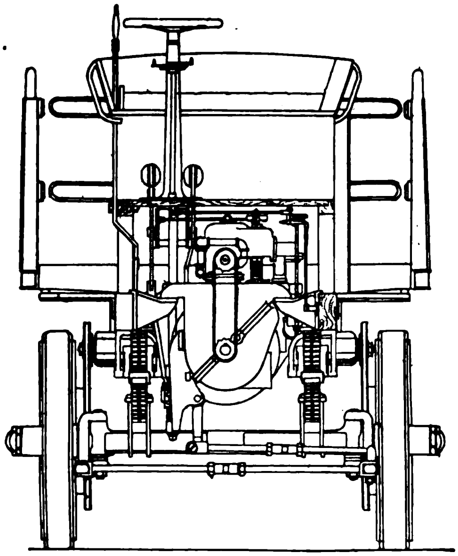


Fig. 4. American motor truck front elevation.

These are 1 in. diameter, turn-buckle adjusted, hexagon nut retention.

THE CHASSIS FRAME.

This is armored ash, sills 6 ins. deep by 3 ins. wide, armored outside with steel 6 ins. by 3-16, armor held to hood by ½ in. carriage bolts, washers and nuts inside. See plan of truck. So far, this armored wood chassis frame has given entire satisfaction to these constructors. It is light and stiff, and is also elastic, and will give and come back home again, while the angle steel frame, if it does yield, does not come back of its own motion.

THE MOTOR.

See illustrations. Fig. 5 shows the motor, left side, complete, and Fig. 6 shows the left side of the motor with the oil basin and side, diagonal dividing plane, removed, fully exposing the crank-shaft and rods. The crankshaft rods and pistons can be expeditiously disassembled and replaced when the crankcase side is removed.

The cylinders are 5 x 6 ins., finished by chucking the cylinders in the lathe and steadyrest and boring with single point tools. The pistons are cylindrical, and are free fits in the cylinders. Four rings, rough inside, are fitted, all above the piston pins. The lower ends of the pistons have 3 oil grooves, and have a piston oiling hooked flange inside the piston at the lower end, with 6 oil holes to the cylinder walls; splash is caught by the hook-flange, and fed to the cylinder and piston contact.

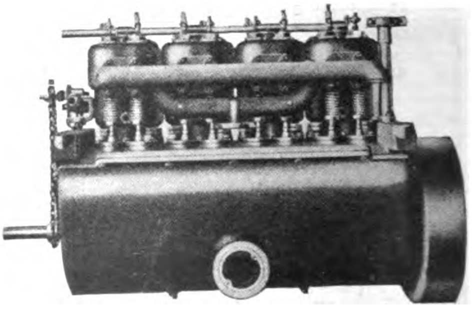
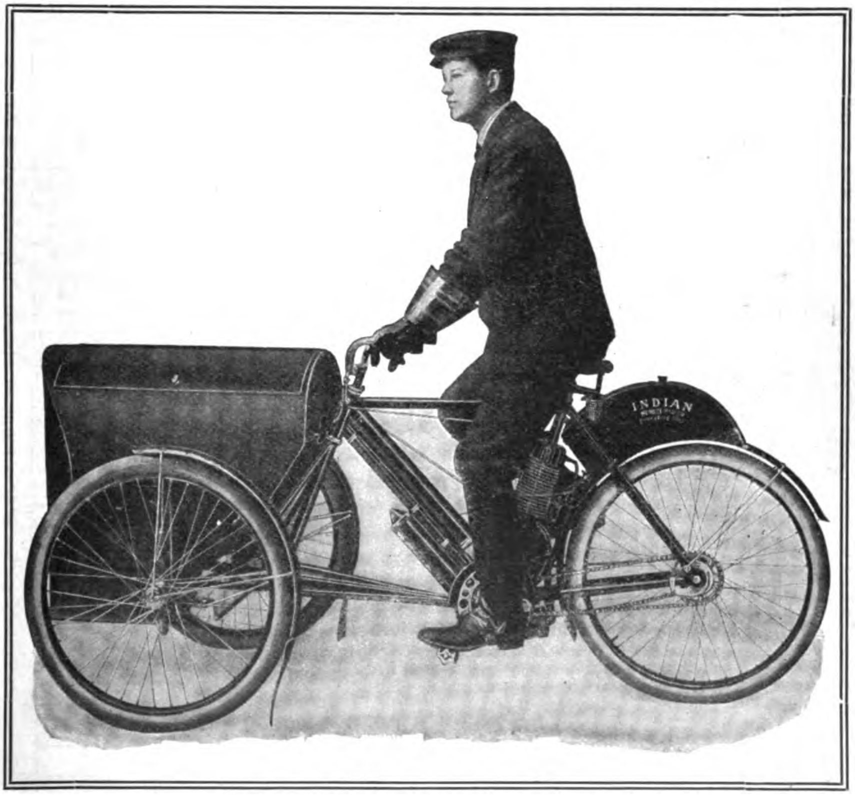


Fig. 5. American truck, 3 to 4 tons, left side of motor. The whole left side and a part of the bottom of the crank box are one integral aluminum casting, the plane of division being at 45 deg. angle. By removing the screws which hold the oil basin the whole crank shaft is exposed. The case-hardened cams have hubs on one side, and are fixed to the cam shaft with one taper pin each. The rollers are tool-steel, 1⅛ diameter, hardened and ground on hard pins, ⅛ in. diameter, ground. The machine steel lifters, squared at the roller forks, are guided in the cut through lower ends of the bronze lifter guides. The valves are steel, heads and stems integral, all same diameter, ports all 1⅝ diameter.

"FOR BUSINESS OR PLEASURE"

INDIAN

Motocycles
Tri Cars
Delivery Vans



FOR BUSINESS

Indian Delivery Van

QUICK, ECONOMICAL, SURE
A good advertisement for any MERCHANT, large or small.

Live dealers will be quick to appreciate the vast field the Delivery Van opens up in the commercial world and will write at once for full information.

HENDEE MFG. CO., Springfield, Mass.

The piston pins, 1⅛ dia., ⅝ holes clear through, are soft tool-steel, ground, fixed in the pistons by fit set-screws, split pin retained. The lubrication is splash, precision oiling, 6 oil leads.

The rods are steel castings, bronze bushed and non-adjustable on the piston pins, and full marine type, castellated nuts and split pins at wrist end, bronze eccentric half-boxes on wrists. The crank-shaft journals and wrist are all 2 ins. dia., journals in babbitted bearings. The planetary change gear is carried on an integral rearward extension of the crank-shaft. The fly-wheel, 18 ins. dia., 180 lbs. weight is fixed to the crank-shaft by 6 bolts, ⅝ dia. driven in reamed holes. The rear end of the transmission shaft is in a babbitted capped bearing.

The counter-shaft is 1¾ ins. dia., bearings 6 ins. long, in babbitted boxes. The bevel gear and pinion are hardened, ball thrust bearings, with spew balance gear.

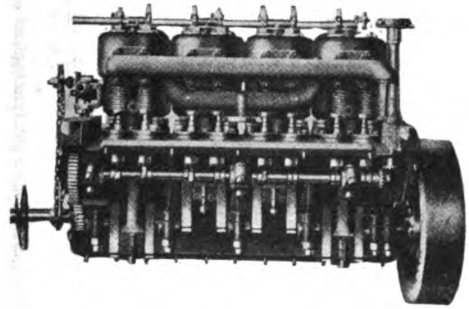


Fig. 6. American 3-4 ton truck. Left side of motor, left side of crank box removed. The cam shaft can be removed by itself, or the rods may be disconnected and the crank shaft may be removed, or the crank-shaft, rods and pistons may be removed without disturbing the cam-shaft, thus making motor part accessibility ideal. All gears are cased in, splash lubricated. The fan, 22 ins. diameter, is on the crank-shaft, and the water pump is chain driven.

The cylinders are set ⅝ towards the working stroke side of the crank-shaft. Various dimensions are given to the offset where used. The normal offset for a 6 in. stroke is of course 1½ ins., but this would give objectionable friction in the piston return, and, as said, various offsets are used, always much below normal.

The brake drums are steel castings, applied to the steel casting wheel hubs, finished outside 15½ ins. dia. x 3 in. face. The brake band is fiber lined.

CONTROL.

The steering is by a triple thread, 1½ p. i., screw on the bottom end of the steering shaft, trunnion nut to the short arm of the steering bell-crank, 4 ins. radius, the long arm being 6 ins. radius to universal joint pin center. Steering wheel 16 ins. dia., 3 turns for full sweep of front wheels. The throttle and spark levers are close under the steering wheels, 180 deg. apart, one on each side, ratchet retained.

There are two pedals, one for rear hub brakes, and one for reversing. The speed change is by a vertical latched lever latched to a notched quadrant for slipping engagement and overtravel for tightening the bands, independent of band adjustments. The outside diameter of the planetary gear case is 13¼ ins.

These particulars, and the reproductions of the working drawings given here, show a carefully worked out design, complete accessibility of moto and motor details, and excellent control.

The choice of the planetary speed change, determined by the impossibility of mis-handling by an inexperienced driver, is fully warranted in view of the extremely good construction and greatly improved design of the planetary gear shown in the illustration, which has a multiple disk high speed clutch, and grey-iron, spring-pressed packing rings which make the gear casing perfectly oil tight. These independently acting packing rings are new to the writer, and this is also the first instance observed in which the multiple disk clutch was applied to the planetary change gear. It is true that the planetary speed change can be badly designed and built of unsuitable materials, and turned out in such form as to give no end of trouble by breakage of weak grey-iron pinions, and it is also, unfortunately, true that such cheap and faulty planetary change gears have been applied to

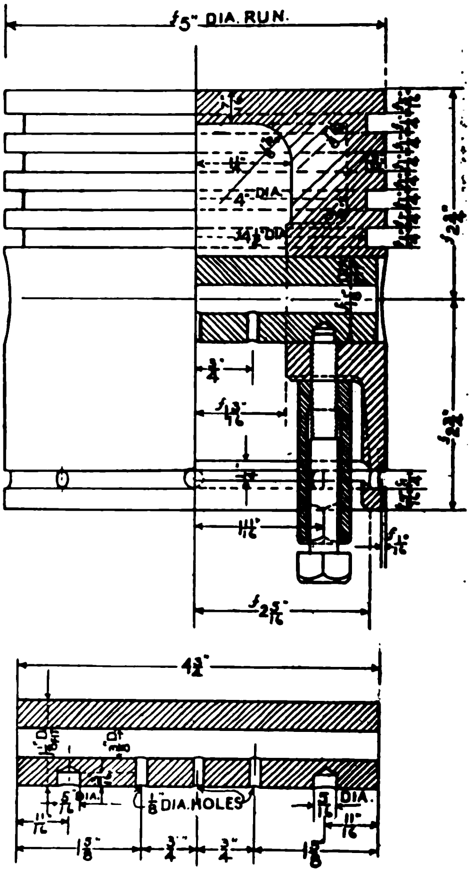
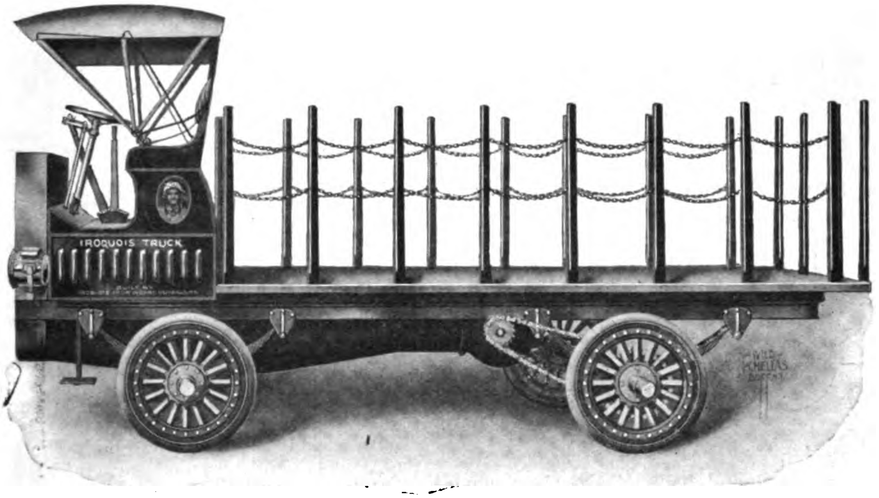


Fig. 7. American truck pistons and piston pins. Note the internal hook-groove at bottom of pistons, to catch oil and pass it through holes in the piston walls to lubricate the cylinder.

Iroquois Truck

Built Like a Locomotive



Our years of experience in heavy work especially adapts us for manufacturing trucks that cannot be surpassed for reliability and durability. We manufacture also automobiles for railroad use, built along the lines of locomotives for construction and strength with capacity for from 30 to 50 passengers.

We are ready to make deliveries on short notice of our 25 H. P. 4 Cylinder 3½ ton Truck.

25 H. P. 4 Cylinder 20 Passenger stage.

We can interest business men because our trucks are an economical commercial proposition. Increased capacity—decreased cost of operation make Iroquois trucks more desirable than horses.

IROQUOIS IRON WORKS

BUFFALO, N. Y.

Sales Department—G. MIDDLETON, 1900 Land Title Bldg., Philadelphia, Pa.

motor cars built and sold in large numbers. Because of the weakness and breakages of these scamped and badly designed transmissions, the planetary speed change has fallen into disrepute, but this is not due to any radical fault of the planetary movement, which is good in itself.

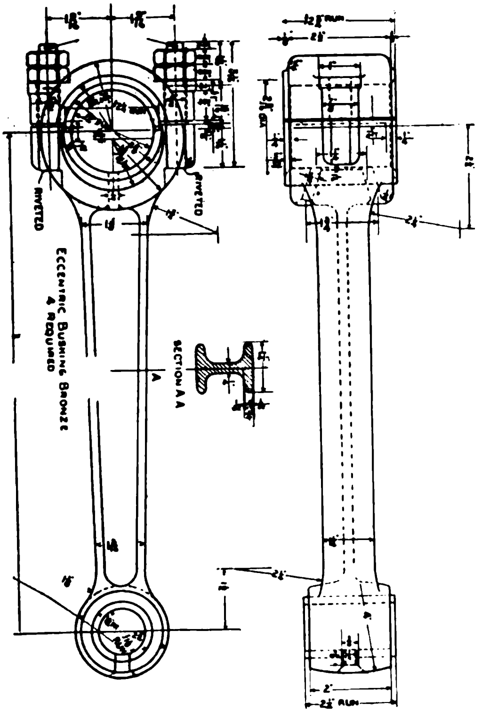


Fig. 8. American truck connecting rod. Note eccentric wrist end bushings.

The American Truck motor shows no pronounced novelties of design except in the diagonal division of the crank-box, the whole side and bottom of which, one piece only, can be quickly removed so as to expose all the working parts carried inside. This is a great convenience, and also a great preventive of "accidents" due to want of attention because of difficulty in reaching and inspecting the rods and crank-shaft of multi-cylinder vehicle motors.

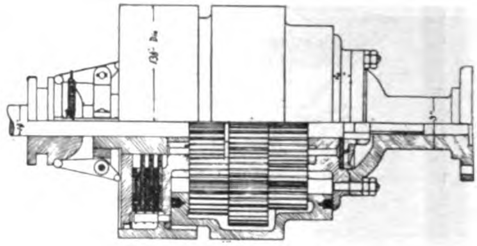


Fig. 9. American truck planetary speed change. Note spring-pushed grey iron all packing rings, and the fiber faced steel plate multiple friction disks. The dimensions given enable the student to scale this drawing.

All of the machine work of the American Moto Trucks is good, and the entire design is the work of thoroughly competent constructors who fully realized the rough service to which cars of this class must be subjected, and the want of mechanical skill in truck-drivers, and who therefore placed the simplest and most readily learned mechanical elements in these substantial and amply powered heavy-duty cars.

Lansden Electric Wagons

The Lansden Co., Newark, N. J., are building a line of electric commercial wagons that have shown exceptional efficiency in actual service.

Mr. J. M. Lansden, the designer of these cars, realized in the beginning that a commercial car to be a success must be capable of doing a minimum amount of work at a certain cost, and that this cost must be lower than that required to do the same amount of work with horse drawn wagons.

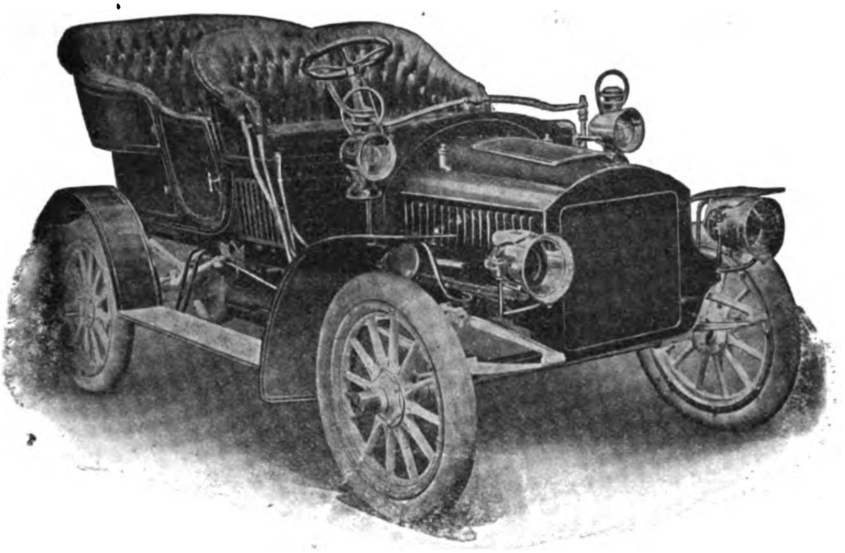
With this end in view Mr. Lansden designed and redesigned, built and rebuilt persistently, experimenting for six years before he offered a single machine for sale. Mr. Lansden explained to the writer that in the case of every car that was produced the amount of H. P. required to do a certain amount of work at a certain speed was accurately measured by the application of electrical recording instruments, and that a record of the actual results achieved were kept for future guidance.

These continued experiments have resulted in the absolute determination of a warranted and satisfactory practice and in the establishing of formula that allows the designing of a new car for a certain clas of work and a certain class of conditions to be a mere matter of mathematical calculations.

Mr. Lansden explained that not mere motor or electrical efficiency but the efficiency of the car as a whole has ever been the aim of his company, and that a motor that would show the greatest electrical efficiency would often not give as good results in practice as one less efficient but better adapted to the kind of work to be performed.

As the cost of current is only a small item as compared with the upkeep of the car, this is a very common sense view. The amount of actual horse power required to do certain work in a certain time has been found by Mr. Lansden to be much less than is generally supposed. In substantiation of this statement he stated that in a recent test with one of their light weight cars, loaded weight 2000 lbs., that it required but 4½ H. P. to drive this car 25 miles per hour. This was accurately computed, and not a guess, and on account of the mistaken ideas which prevail regarding H. P. they guarantee their cars to do so much work in a certain time, rather than to give the rated H. P.

Mr. Lansden has made a close study of the commercial wagon, and considers that the production of a successful motor car is an engineering feat, and the work to be done and the road conditions and the exact service the car is expected to perform should be known



A large, roomy, five passenger, 22-horse power touring car, with sliding gear transmission and other features. Usually found only in high priced cars. **$1250.** It climbs the hills.

RELIANCE

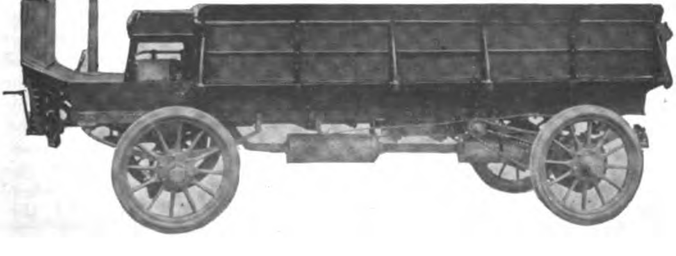
MOTOR CAR CO.

23 Fort St., Detroit, Mich.

Commercial Motor Wagons

Capacity two and 3 tons. Any style body. 50 per cent. to 75 per cent. less parts than any Motor Wagon on the market.

Write for Catalogues.



to the engineer.

Mr. Lansden has developed several sizes of standard chassis, which are exactly alike with exception of size. These are fitted with battery and geared so as to give the greatest efficiency, the conditions under which the car will have to operate being taken into account, every car being regarded as an individual problem.

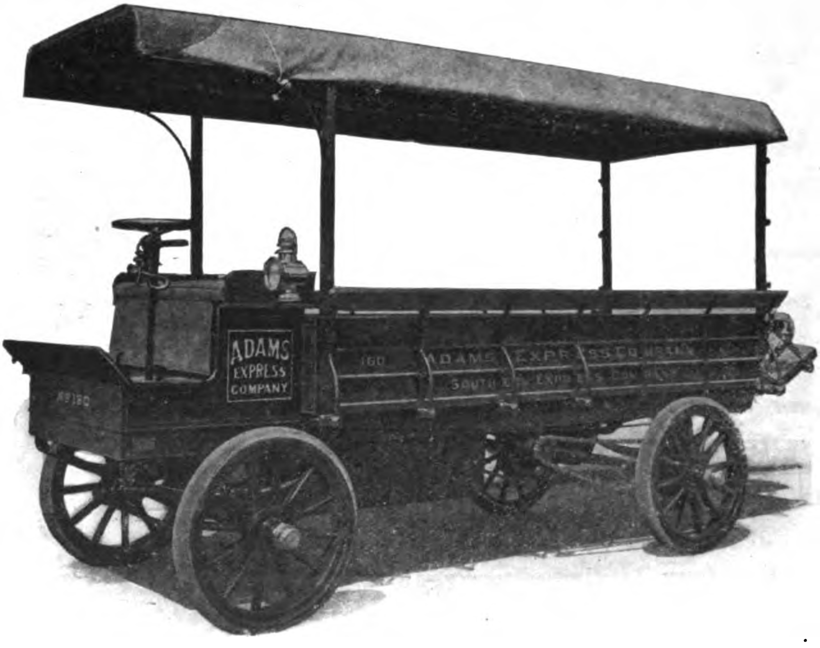
While the Lansden machines were still in the experimental stage no machines were sold, but several were placed in the hands of New York concerns and put into every day service, so that he could study the conditions and requirements for the different lines of delivery service.

Mr. Lansden is a great believer in the light wagon, appreciating that light weight lessens the cost of maintenance throughout, and good design and good materials, together with a light weight battery, has enabled him to produce a car that is considerably lighter than many cars with the same speed and carrying capacity on the market. The Lansden one-ton truck weighs less by more than 1000 lbs. than most other trucks of like capacity.

The mileage of the different sizes of Lansden cars varies with the work to be performed, as it is often advisable to recharge the batteries rather than to carry the additional weight in battery for any unusual distance.

Several Lansden cars are doing regularly 40 miles per day, the rated capacity being only 25 miles on one charge of the battery.

This was accomplished by giving the cars a charge at the noon hour, and in these cases this was to be preferred to the additional weight of battery required to do the distance on one charge.



Lansden Type 46-A, General Electric, motor 3.85 H. P. (24-hour rating) swung on rear of chassis frame; 60-cell Edison battery forward, underslung; chain drive; three forward speeds and two reverse; tread 66 inches; wheel base 111 inches; Firestone tires, 36x4 inches, carrying capacity 2 tons; carrying space 11 feet by 4 feet 6 inches; weight 4700 lbs.; price, including "ACE" charging plug, storm apron, etc., $3100.

The Lansden cars are exceedingly simple and strongly made, and no Lansden car has ever been broken so seriously that it could not be repaired in a few hours. Reliability and low cost of maintenance has been the result sought for and achieved, and in a number of instances the cars have been in service for a year without being out of commission for a single day.

THE LANSDEN ELECTRIC TRUCK CHASSIS.

The chassis of the Lansden car is complete as far as operation is concerned, no part of the mechanism being on the body. With the flexible design of chassis used an endless variety of bodies may be applied.

The chassis frame is of the armored wood type, and is rectangular in shape, light, strong, and is elastic to a certain extent, which is to be desired for electric vehicles.

The frame carries the entire weight of the power equipment, and is carried on four semi-elliptic springs which are securely clipped to the solid axles. The artillery wheels are fitted with endless solid rubber tires and roll on Hess-Bright ball bearings.

Mr. Lansden recently made experiments to determine the amount of energy required to drive the same car equipped with solid rubber tires and equipped with pneumatic tires, and found that at the speeds at which an electric car is usually operated that the solid rubber tire consumed 20 per cent. less current than the pneumatic. At higher speeds the loss was not so great. The wheel treads are either 56 or 66 ins., and the wheel base ranges anywhere from 76 to 111 ins., according to the standard chassis selected.

The single motor by which all Lansden

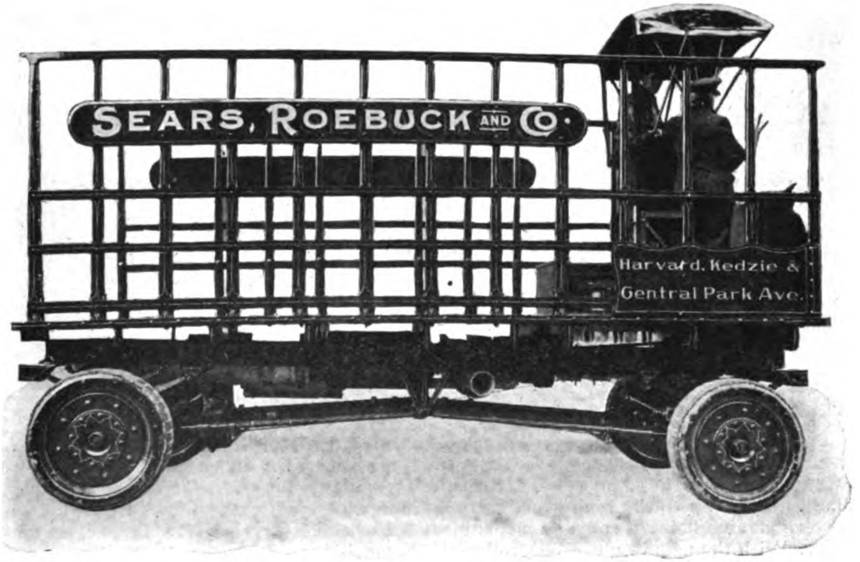
The Four-Wheel Drive Truck

is the most powerful truck in the world

Because The power is applied to **All Four Wheels**
The wooden tires do not slip or skid

Does not use
Rubber Tires

Uses inexpensive
Wooden Tires


SEARS, ROEBUCK AND CO.
Harvard, Kedzie &
Central Park Ave.

One Gasoline Truck

Does the work of 3 teams at a cost of $8.00 per day.

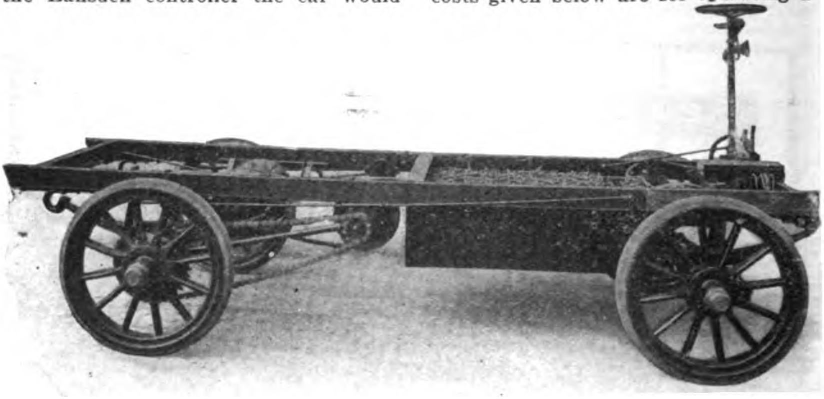
Will pull its own load and trailer besides, through sand, mud and snow.

Four-Wheel Drive Wagon Company

Vliet Street
Milwaukee, Wis., U. S. A.

cars are propelled is mounted on the chassis frame, and is not subjected to the severe shocks occasioned by rough roads, as is the case where the motor is mounted on the gear. The motor is built especially for this service and is the result of years of experiment, and is designed to give a most constant torque and steady pull under varying kinds of work.

The controller is of Mr. Lansden's own design, gives four forward speeds, and is so arranged that no shock whatever is thrown on the mechanism in going from one speed to another, the load being picked up gradually, as no break in the current occurs. This is a great advantage, as with the usual type of controller in passing from one point to another the current is momentarily broken and the car gets a shock or jerk as each point is passed. To illustrate this point, suppose the car is delivering goods, covering 30 miles during the day, and makes six stops per mile. With the Lansden controller the car would receive 180 jerks, or one for each time the car was started. The load would then be gradually picked up to the high speed without any severe strains being thrown on mechanism and gear. With the usual type of controller giving four forward speeds the current would be broken four times, every time the load was picked up from slow speed to high, and the car would receive 720 shocks or jerks in covering the same terrritory. The elimination of the severe strains that are bound to occur from a sudden application of power is sure to add to the life of the car, being especially beneficial to the transmission system and to the tires.



Side view Lansden Electric Chassis, fully described in text.

One Lansden machine has had 10,000 miles' service on one set of tires, and they were still in use, and the cost of tires on all the machines they have in operation has been very low. This is undoubtedly due to the correct size of the tires used, the light weight of the cars, and to the steady manner in which the power is applied.

The drive is entirely by chains and sprockets, giving a flexible and efficient transmission, and was adopted as being the more simple and less liable to give trouble than any other system in the hands of the inexperienced driver. Tests have also shown the chain drive to consume less power than gears, and to better adapt itself to changes in alignment occasioned by running over rough roads.

The single motor is hung in the rear, with single chain forward to differential or countershaft, final drive by double chains to the rear wheels.

The battery compartment is underslung and carried well forward. The battery used is the Edison cell, which is extremely light for its capacity, and is said to be very efficient. The arrangement of mechanism and batteries allows an equal distribution of the weight and equalizes the wear on the tires.

A standard concentric charging receptacle is located conveniently, and a safety switch for cutting off the power is within easy reach of the operator.

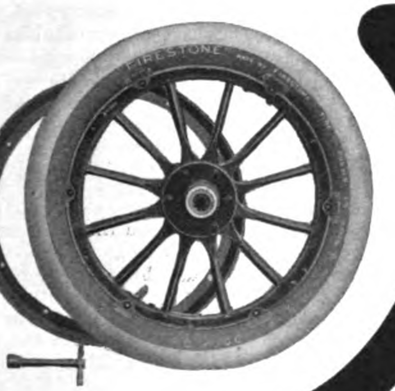
The writer was shown several cost sheets for operating vehicles made up from the books of several firms using these cars. The costs given below are for operating a one-ton wagon, used by a well known New York company for the past eleven months. These figures are extremely interesting, as New York delivery service is severe on electric machines. The low cost of repairs is especially interesting, and in the original sheet from which this was compiled the repair bill was itemized, showing exactly what repairs were made.

TRUCK IN SERVICE ELEVEN MONTHS.

Int. & Dep. Cost $2,100.00	$385 00	
Charging	254 56	
Salaries, two men	1,184 00	
Storage	220 00	
Water	24 00	
		$2,067 56
Expenses of repairs		85 72
Total expense		$2,153 28

Days in service	276
Average day's run	23 Miles
Longest day's run	34 Miles
Days out of service on account of battery failure	2
Days out of service on account of wagon failure	0
Miles run	6,624
Cost per mile	$0.325
Cost per day including collecting from and delivery of goods to offices.	$7.80
Cost of two wagons and two delivery clerks to do same work	$11.00 per day.

The Lansden Co. guarantee all wagons absolutely for one year from date of sale, and are able to give accurate estimates on the cost of operating and the upkeep of the cars.



"Firestone"

MORE THAN

85%

of all rubber tires used on commercial automobiles in this country are FIRESTONE TIRES. This is not guesswork. We can prove it. You can prove it to your own satisfaction by observation and actual count of the first hundred commercial automobiles you see.

THE FIRESTONE SIDE WIRE SOLID TIRE marked an era in tire building.

They never come off the rim no matter how heavy the load or severe the service.

They are built upon honor, of the choicest materials that money can buy and with the best skill to be found anywhere.

Their wearing qualities cannot be excelled. These are the reasons why FIRESTONE SIDE WIRE SOLID MOTOR TIRES are used more than all others.

FIRESTONE TIRE & RUBBER CO.

AKRON, OHIO.

BRANCHES: New York, 1788 Broadway.
Boston, 9 Park Square.
Philadelphia, 211 N. Broad,
Chicago, 550 Wabash Ave.
St. Louis, 2226 Olive St.
Detroit, 240 Jefferson Ave.

PNEUMATIC TIRES

Have Caught the Popular Fancy

They were examined by thousands at the New York, Chicago and other Shows and invariably commended.

The FIRESTONE PNEUMATIC TIRE is built from the best materials in the most careful manner. The easy accessibility of the inner tube, together with their freedom from possibility of danger, makes them ideal.

FIRESTONE PNEUMATIC TIRES cannot possibly come off the rim and if not otherwise fastened, the flanges alone would hold them in place. We safeguard them, however, by the use of steel clips, securely riveted to the edges of the tire. Through clips, the flanges and felloe, half inch bolts are passed and firmly screwed in place.

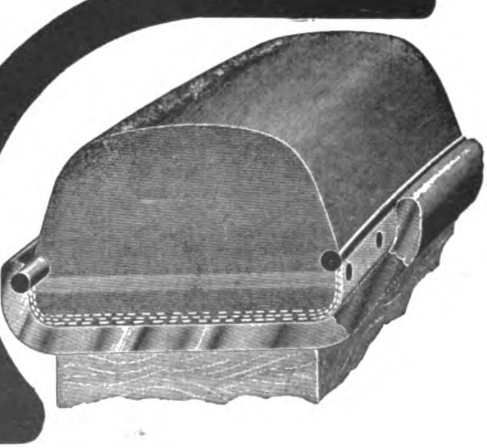
A FIRESTONE PNEUMATIC TIRE though fairly cut into ribbons would remain firmly seated in the rim. There are no parts to work loose and permit the tire to fly off while running and the possibility of rim cutting is entirely eliminated.

The fact that 85 per cent. of all commercial automobiles are equipped with FIRESTONE SIDE WIRE SOLID TIRES is a guarantee of their superior excellence.

THE FIRESTONE PNEUMATIC TIRE is just as good and our mechanical fastening removes every objection heretofore existing to the use of PNEUMATIC TIRES.

Booklet and further information upon request.

"Firestone"



Twenty-two of these wagons have been sold to the Adams Express Company, the majority of which are one-ton trucks, and are in operation in Washington, D. C. The two-ton truck illustrated is the latest addition to their commercial line, and was designed and built for the Adams Express Company.

The electric wagon has a number of advantages for commercial purposes. It is quiet in operation, reliable and simple, and does not require an elaborate outfit for repairs, and best of all, can be operated by an inexperienced man.

The 1906 Indian Delivery Van

The 1906 line of motor cycles, manufactured by the Hendee Manufacturing Co., Springfield, Mass., includes a tri-car for delivery purposes, which is driven by a 2¼ H. P. Hedstrom motor. It possesses a special feature in the spring device used on the two wheels of the van attachment.

This spring device is an independent helical suspension, used on all Indian tri-cars and illustrated elsewhere in this issue, which allows independent deflection of each wheel without disturbing the balance of the whole machine on uneven roads.

By thus eliminating shocks and preserving the equilibrium, the machine damage to merchandise from this cause is entirely avoided. In the double grip control used on 1906 Indian motor cycles, the right grip operates the spark and exhaust valve and the left grip controls the throttle and contact breaker.

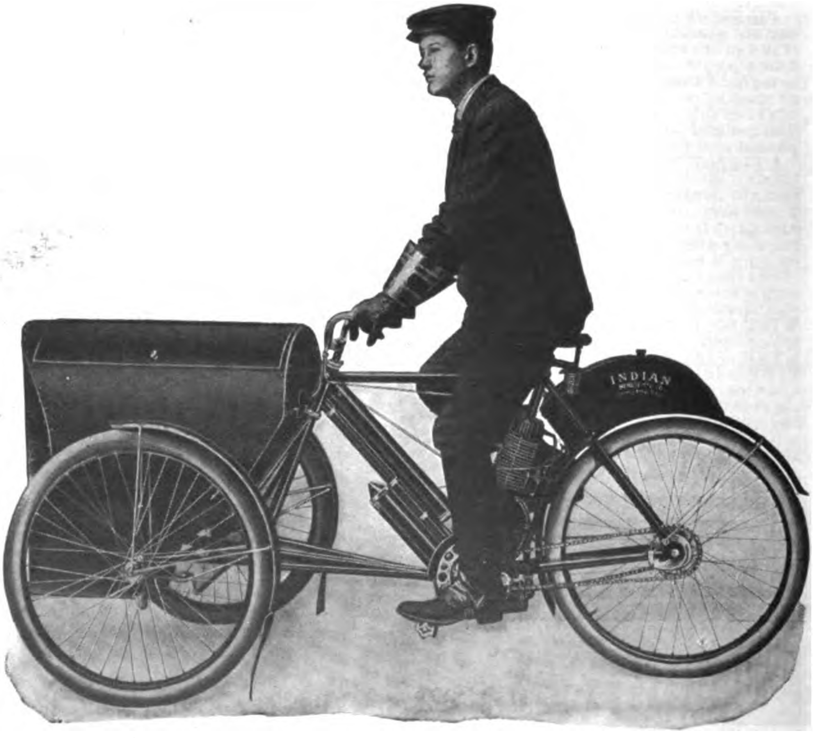
The delivery body is made of metal and can be divided by shelving into any size suitable for the user.

If desired the delivery body can be easily removed and a seat or chair affixed, or it can just be used as a motor tricycle or bicycle.

The price of the complete motor cycle and van is $335.00. The motor cycle alone is $210.00, and van attachment alone, $125.00.

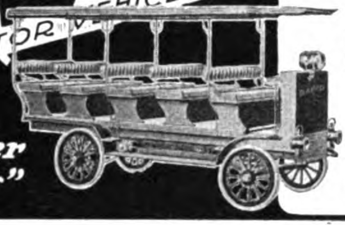
This machine makes a very practical delivery vehicle, and is easily converted into a pleasure vehicle. It has many points in its favor, such as low first cost, economy of operation and of care and keep. It is always ready, and may be operated by a man or boy with very little mechanical knowledge. It is very simple and very light and therefore more readily handled.

The tri-car was thoroughly tested during all of the year 1905, not merely privately but publicly. Carrying two passengers in the F. A. M. endurance contest, it completed the 250 miles from New York to Waltham, Mass., in the officially scheduled time of 16 hours, 20 minutes, successfully negotiating, as it had done before and has done since, that sand ridden portion of the route near Palmer, Mass. In a public contest it has covered 16 miles with one pint of gasoline, and in the Brooklyn Motocycle Club's economy test from Brooklyn to Southampton, L. I., and return, 190 miles, it carried three passengers, weighing 430 pounds, at the marvelously low cost of 22 cents per passenger, completing the distance in less than 11 hours actual riding time. The railway fare for the same journey is $4.35; the best record by automobile, 88½ cents per passenger.



The 1906 Indian 2¼ H. P. Delivery Van. Price $335 complete.

The Rapid Motor Vehicle Co. Commercial Motor Cars



"We Deliver the Goods"

Here is a car that is needed at every club, hotel, or country place.

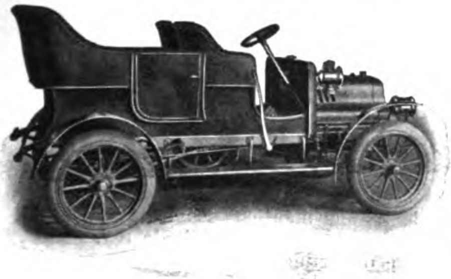
Our 20 passenger bus is a rapid, comfortable and economical means of transportation for guests of clubs, hotels and country places. Also a model conveyance for sight-seeing parties, and as a means of rapid transit between villages and rural communities. Rear seat may be removed to give room for baggage.

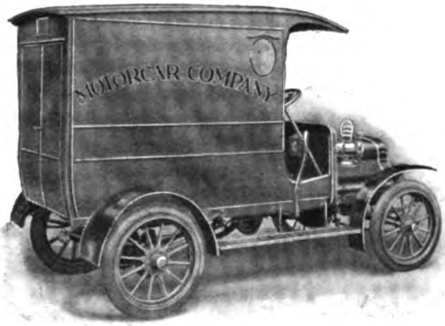
Price, 20 passenger car,	$2200.00
" 12 " "	$1600.00

Every Car Guaranteed for One Year.

We also make a full line of delivery cars and trucks. For full particulars address B. M. HENRY, Sales Manager

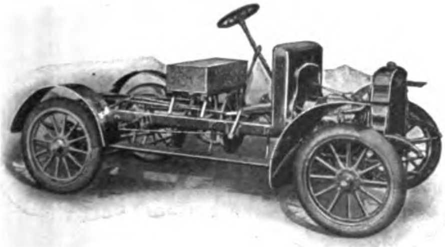
RAPID MOTOR VEHICLE CO. Pontiac Mich.

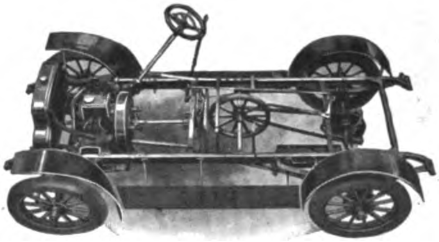




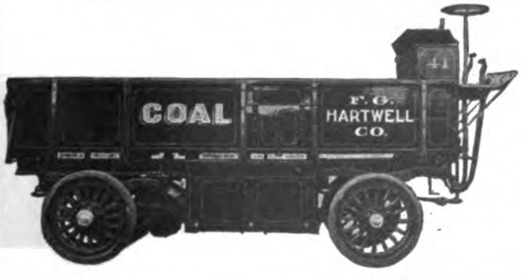
No clutch to slip. No gears to strip. Holds on any hill. Our own patented friction transmission driven by our special designed 2-cylinder motor. Will climb any hill. Write us for particulars.

MOTORCAR COMPANY, Detroit.





SYNNESTVEDT MACHINE COMPANY



PITTSBURG, PA.

Manufacturers of

Electric Vehicles

Delivery Wagons Trucks

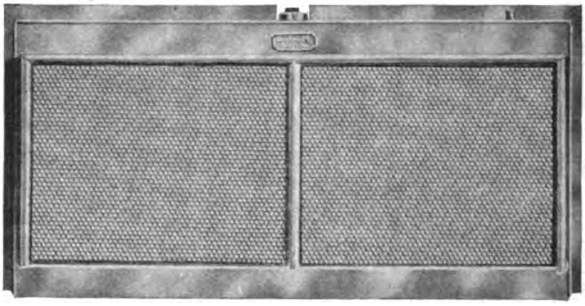
Stanhopes Surreys

Busses

EASTERN BRANCH — 1005 Drexel Bldg., Philadelphia

Commercial Automobile Co. Distributers

1886 Michigan Ave., Chicago, Ill.



A Fedders Truck Radiator.

Fedders Truck Radiator

The Fedders Mfg. Works, Buffalo, N. Y., manufacture radiators in shape or size in small quantities, on which they are able to make very prompt deliveries. These coolers, one style of which is shown herewith, are constructed the same as those they make for well known touring cars. They present a fine appearance under the footboard or in front of the dash board.

This company accepts orders for single coolers, as per sketches, and make deliveries in a week after receipt of orders.

Each Automobile has Replaced Three Teams

A letter to Fuller & Fuller, wholesale druggists, Chicago, Ill., regarding the automobiles used in their delivery service, brought the following reply, which is self-explanatory:

Chicago, Ill., March 5, 1906.

Editor Commercial Wagon Dept.,
Cycle and Auto. Trade Journal,
1213 Filbert St., Phila., Pa.

Dear Sirs:—The Knox automobiles used in our deliveries have given us very satisfactory service, and we find they have a distinct advantage over the horse in the winter, when our streets are liable to be slippery, which condition does not seem to interfere with the automobiles, but does, quite seriously, with the horse. We have had the automobiles in service about nine months. Each automobile has taken the place of three single teams in our drayage department.

Yours truly,
FULLER & FULLER CO.,
(Signed) Jos. G. Peters

Ad-el-ite Auto Specialties

Are Money Makers and Money Savers for

Garages, Supply Houses and Owners

1. **AUTO-BRIGHT,** for brass parts, gives a polish that water and moisture doesn't affect. Works quickly. Doesn't hurt the leather or varnished surfaces.

2. **AUTO BODY POLISH** revives and renews the dulled varnished and leather surfaces of cars. Brings back all the old lustre. Doesn't harm the finish.

3. **AD-EL-ITE MOTOR ENGINE PAINT** for cylinders, mufflers, etc., will not burn off, flake or scale. Withstands the severest heat.

4. **AD-EL-ITE PAINT AND VARNISH REMOVER** takes off any old finish almost instantly. Doesn't injure the finest veneer.

WE MAKE OTHER PREPARATIONS BUT these are our leaders. Ask your dealer for them or write to us.

Distributors,
85 Oliver Street,
Boston, Mass.

Adams & Elting Co.
CHICAGO. U.S.A.
CHICAGO

Warehouse,
247 Pearl St.
New York City

Dept. 8.

MOTOR BOAT
DEPARTMENT OF THE
CYCLE AND AUTOMOBILE TRADE JOURNAL

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Coming Marine Events

April 1-15—Monaco Motor Boat Race Meet.
April 7-14—First Annual Chicago Power Boat Show, First Regiment Armory, Michigan Avenue and Sixteenth Street. W. C. Anderson, 2435 North Robey Street, Chicago, Manager.
April 8-21—Annual Regatta at Cannes, France, including Motor Boat Race for Burton Cup.
April 16—Meyan Motor Cup Race, Nice, France.
April 17-24—Motor Boat Race along the Riviera, France.
May 6-13—Motor Boat, Race, Suresnes, France.
May 27—Motor Boat Races, France.
June 28-29—Motor Boat Races at Kiel, Germany.
July 1-8—Motor Boat Competition, France.
July 8—Start of the "Paris to the Sea" Motor Boat Race.
July 8—Motor Boat Race for Dubonnet Cup, Nantes, France.
July 10-11—Motor Boat Race on Lower Seine to the Sea, France. Les Sportes, Paris.
July 10-20—Cup of France Competition for Motor Boats.
July 11-16—Motor Boat Contests, France.
July 20-August 3—Motor Boat Meets in Italy.
July 22—Motor Boat Competition, France.
August 6-18—Fortnight of Motor Boat Competition, France.
August 14-19—Trouville Cup for Motor Boats, France.
Sept. 10—Motor Boat Race Meet at Arcachon, France.
October 14—Motor Boat Race Meet, France.
December 2—Salon Motor Boat Cup Race, Paris.

The Engine and Boat Manufacturers Should Hold their Own Show

Is it not about time that the National Association of Engines and Boat Manufacturers should take hold of the annual Motor Boat Show itself? Why should the Madison Square Garden Co. and Sportsman's Exhibition Co. be allowed to run this show and reap all the profits thereof. The exhibitors are charged large prices for the spaces. In fact, the charge for space is now about sufficient to cover the entire expense of the show and all of the box office receipts are profit. About 80 per cent. of the space is paid for by the Motor Boat trade, and if the National Association of Engine and Boat Manufacturers were to take charge of the show themselves the box office receipts could be divided among the exhibitors, who would then get back a large percentage, if not all, of what they paid for their spaces. Why should the motor boat and engine makers furnish the attraction for the show and pay for the privilege of exhibiting as well? If there is any money to be made out of the show over and above the rental of the building, the exhibitors themselves should be the ones to have it. The N. A. E. and B. M. should look into this matter at once and formulate the plans for the holding of the 1907 show under their management.

The Association of Gas Engine Builders

During the recent Motor Boat Show the manufacturers of three-port, two-cycle gas engines formed an association with the title of the Association of Gas Engine Builders. The officers of the association are: President, Lou Burt, of the Detroit Auto-Marine Co.; Vice-President, J. S. Graham, of the Rochester Gas Engine Co.; Secretary-Treasurer, W. J. Graham, of the Rochester Gas Engine Co. The new association has employed T. F. Bourne as patent counsel. Mr. Bourne is making a search of gas engine patents to decide upon the validity of the Day and Sintz patents now owned by the Oldsmobile Co., who are represented by James Whittemore, of Detroit, Mich.

The Plymouth, Mass., Town Board have adopted an ordinance requiring the power boats used on waters within the town to be provided with an under water exhaust or muffler, and fixing the fine at $100 for violation of the ordinance.

American Power Boat Association Meeting

At the annual meeting of the American Power Boat Association held on March 7, Secretary Anson B. Cole reported that there were forty-nine clubs enrolled in the Association. A special committee on legislation, Frederick A. Hill and Edward M. MacClellan, reported in favor of the passage of a bill that would regulate power boats in some way, and it was instructed to confer with other associations on the matter. The following officers were elcted:

James N. Oliphant, Thousand Islands Yacht Club, president; Anson B. Cole, Manhasset Bay Yacht Club, secretary; J. Howard Wainwright, American Yacht Club, treasurer; Henry J. Gielow, Atlantic Yacht Club, measurer.

Two-Cycle Engine Patents

Our motor boat readers will be greatly interested in the review of two cycle motor patents by Hugh Dolnar, published in the forward part of this issue. In this article Mr. Dolnar has brought out forcibly the exact condition of the two-cycle patent situation and has also in a great measure given a history of the two-cycle engine development.

Fay & Bowen Marine Engines

Fay & Bowen Engine Company, Geneva, New York, are large manufacturers of marine motors and motor boats. One of their most popular models is a 7 H. P. 2 cylinder with improved base. These motors are of the 2-cycle type. A feature of the frame is the fact that all openings are large, making it easy to reach any part of the motor when necessary. The exhaust outlet is also of liberal size. While the frame is not heavy no part is skimped in weight and the whole construction is strong. The ignitor plug is inserted in the hole nearly in the centre of the cylinder head and is "ground in" to insure a perfect fit, being held in place by four nuts and studs. By removing this plug the cylinder can be examined at any time without removing the head, the hole being large enough to expose a large part of the interior to view.

The cylinder head is completely water jacketed and its inner surface is so shaped as to facilitate the discharge of the burnt gases, there being no angles or pockets to obstruct the passage to the exhaust ports.

The crank shaft is steel forged "hammer finished in the blank" and machined to perfect bearings surfaces. Counterweights are provided to balance the piston and connecting rods. In the multi-cylinder motors, the crank shaft is one continuous forging with throws set to give uniform impulses and in each cylinder the reciprocating parts are counterbalanced, and the counter weights are held to the shaft by keys kept in place by filister head screws, pinned after being driven home. The bevel gear which drives the ignitor shaft is also firmly screwed to the crank shaft. Very long bearings are provided.

Their ignitor is of special construction, which is patented. The ignitor is driven by a shaft passing through the motor shell or frame and operated by gears. The action of the ignitor is quick and positive and a large spark is produced regardless of whether the fly wheel is turned rapidly or slowly. No time is wasted in "cranking up," as the spark is produced as soon as the ignitor is put into operation.

The electrodes inside the firing chamber are so located as to bring them directly in the path of the fresh incoming gases, and they cannot become overheated. Each of the electrodes is provided with Baker special sparking points which are unaffected by heat.

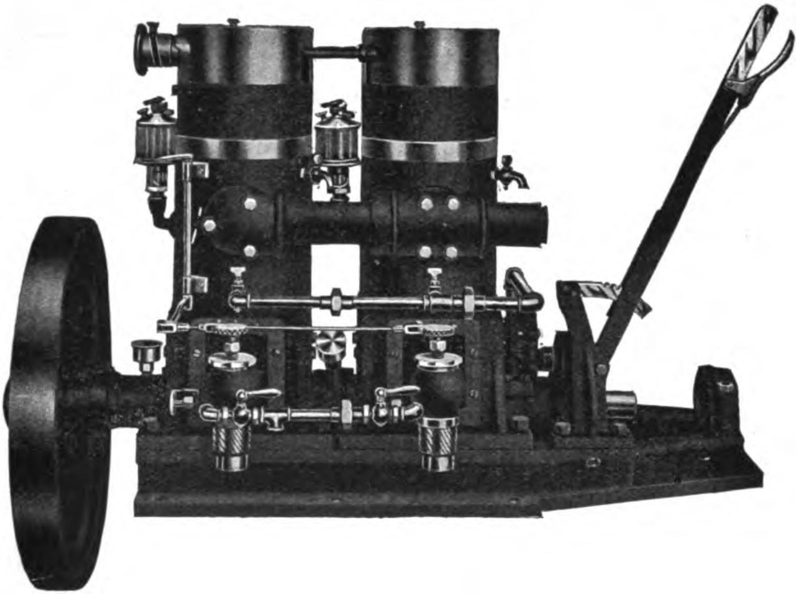
Pistons are fitted in the engine while the engine is hot, insuring perfect fit under normal operating condition of the cylinder. Rings are properly fitted and are pinned in place with the joints broken to insure against leakage.

The vaporizer or generator valve is of their own design and has been found to give excellent results. It operates only as the motor runs and feeds a charge with each upstroke of the piston. The vapor formed can be regulated so that only sufficient for the requirements of the stroke is furnished and the accumulation of gasoline in the crank case is thus prevented. In the large multi-cylinder motors an auxiliary throttle is provided so that the vapors can be regulated simultaneously, while it can be independently regulated by its individual throttle.

Water is circulated by a rotary pump operated by the crank shaft, the flow of water being regulated by the sea valve to keep the motor at any desired temperature.

The fly wheel is of liberal size, but they carry in stock fly wheels of different sizes for each motor and can furnish them to suit particular conditions. The exhaust gases are expanded through a double muffler being first expanded in one, then in the other, before being finally discharged. They claim that this muffler not only produces silent exhaust but also prevents back pressure. The exhaust pipe is water jacketed, cooling water going into the muffler which is drained on the under side.

Fay & Bowen motors are equipped with reversible propellers having blades of solid bronze. The smaller motors have two blade propellers. The larger ones have their new pattern three blade propellers.



Fay & Bowen 7 H. P. Double Cylinder Marine Motor.

Th improved motor base contains a self-aligning thrust bearing and greatly facilitates installation of the motor. The ball bearing on the propeller shaft is adjusted at the factory so that it comes in just the proper place on the shaft to bear against the thrust. As a simple coupling of universal pattern is used, the thrust bearing takes entire thrust of the screw. By this construction, the engine crank shaft is free to work without unnatural strain.

They are offering several types of motor boats, building the old fan tail model to order and putting out regularly models of the "torpedo" hull type and flat stern "cruiser" type, which have proved very successful.

All their stock boats are built on the torpedo hull and cruiser lines. They are in position to accept orders for special cabin launches and already have a number of these in process of construction, ranging in length from 35 to 40 feet.

Twin Screw Motor Boats

THOS. J. FAY, E. E.

Safety on the one hand and space economy upon the other augurs much in the direction of twin-screw motor-boats. True, the first cost of a twin screw boat, for a given power, will be more than that likely to obtain for chinery required in twin screw service will the single motor equipment.

It is also probable that the weight of ma- be somewhat in excess of the machinery utilized, on an equal basis of power, in single screw service, nevertheless twin screw boats are likely to prove popular and very serviceable indeed.

Amongst the advantages of the twin screw arrangement is the almost complete immunity from a complete suspension of power, which in a boat of any sort is distinctly objectionable. That the power equipment could be wholly disarranged in a twin screw boat is a trifling probability to say the most, especially provided there are two complete power plants aboard, including motors, transmissions, fuel tanks, and in fact, everything essential to the operation of the plant.

(a) Either port or starboard equipment alone.

(b) Both port and starboard equipments simultaneously but independent of one another.

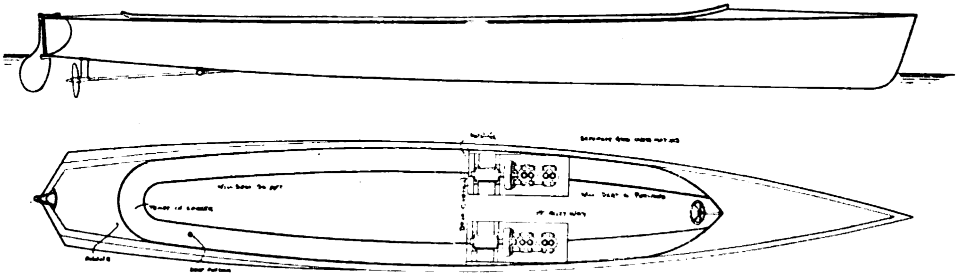


Fig. 1. Plan and profile of 60 H. P. twin-screw S. & M. power boat.

(c) Both port and starboard equipments simultaneously and interlocked.

It would seem like the height of folly to go to the expense of a double equipment and end up by providing but a single fuel tank on some pretext or other, as for illustration, on the ground that two separate fuel tanks do not store well, or take up room desired for something else.

It may be well, on the whole, to consider fuel of vastly more value than lots of other things easily thought of, and in a measure at any rate desirable upon a cruise in a motor boat. Gasoline, if the fuel employed and most likely it will be, is not a product to be stored in a careless fashion in some out of the way corner; moreover, it is a product with a decided tendency to escape through openings by far too minute to afford the passage of water.

The machinery, as for illustration the motors, can not be placed as one might place like furniture in a house, in places to suit the taste of the individual.

As a matter of fact the motors must be placed in what probably is the most valuable space in motor boats, i.e., amidships. Otherwise twin screw boats are distinctly an advantage from the space point of view, for as may be readily understood, two small motors admit of one passage between them, whereas one large motor will not afford one passage on each side of it, considering the average motor boat.

And again, the two small motors will take up less space endwise, thus leaving more actual space both before and abaff the motor compartment.

As may be noted by an inspection of the hull illustrations, Figs. 1 and 2, the cockpit aft is particularly commodious, which, however, does not prevent six people from finding seating capacity in the space before the motor compartment, with easy access between the two passenger spaces, since the motors are well in under the coamings on the port and starboard side amidships, as the illustrations show, with a minimum of 13 inches space between nearest parts in juxtaposition, which nearness of approach, however, is not that of mooring parts, for everything that has motion is covered by an aluminum housing.

This particular hull with its twin 30 H. P. motor equipment will be used next summer as a family boat on one of our beautiful inland lakes, and will be expected to afford ample space, every convenience, great safety, ease of control and something like a speed of 18 miles per hour under favorable conditions.

That this boat is to be in any sense a racing affair is not to be supposed, her beam for her length precludes the chance, nor would the weight of the hull and machinery permit speed such as racing conditions would seem to demand.

Nevertheless 18 miles per hour is by no means a slow boat, nor is it believed that many of the so-called racing boats would do even as well. Anyway this boat will not do much better than the speed named, notwithstanding the ability of the motors to furnish nearly 70 horse power under favored conditions and 60 horse power with ease, at the normal propeller speed of 800 revolutions per minute. The motors are of the Simplex III. type, the main dimensions of which are as follows:

Cylinders, cast gun iron S. & M. mixture; diameter, 4½ in.; piston stroke, 5¼ in.; piston displacement, 87.5 cu. in.; combustion chamber, 30 cu. in.; thickness o walls, ¼ in.; water jacket, composite, diameter of cylinder holding bolts, ½ in.; number of cylinder holding belts, 6; cylinder cast in pairs; pistons, cast gun iron, S. & M. mixture; connecting rod length, 11½ in.; crank shaft connection rod pins, 1st and 4th 180 deg. from 2d and 3d; crank shaft bearing diameter, 1¾ in.; crank shaft bearing length, 3¼ in.; connecting rod bearing pin diameter, 1 1-16 in.; connecting rod bearing pin length, 2 7-16 in.; cam shafts, opposite sides; cams, cut integral; connecting rod, I section; weight of motor, 485 lbs.; ingition, high tension battery jump spark, high tension magneto jump spark; carburetor, float feed, rich primary mixture for starting and auxiliary air supply adjustable in accord with variable speed requirements; water and oil circulation, by means of a suitably designed gear pump at a low speed; fuel, held in a copper tank isolated from the hold and fed to the carburetor under exhxaust pressure through an automatic valve limiting the possible pressure to the desired amount.

There are a great many details about the motors in these boats that do not admit of discussion in the limited space at the writer's disposal, nevertheless there is one point that is of such great value and importance that to leave it out is not deemed advisable.

It has long been felt that continental motor manufacturers had some secret methods that enabled them to build motors of great power, masterly endurance and light weight. members subjected to high alternate stresses or shock, nor is nickel steel looked upon with favor.

Nickel chrome steel is certainly superior to any other product now to be had for any such purposes even though it does cost from 12 cents to a dollar a pound, depending upon the shape in which it must be wrought and the qualities exacted of the mill.

The parts made of especial high steel in the motor for the boat in question are required to stand minimum physical tests.

Some of these products are made in America and in a few cases have to be imported. The ability of the respective motors may best be noted by inspecting the torque and speed curve, Fig. 3, which shows 33 H. P. at 1000 revolutions per minute, because

$$\frac{33\text{x}1000}{1000} = 33 \text{ H. P.}$$

it being the case that the pull was found to be 33 pounds on the end of a lever 5 ft. 3 in. long, when the motor speed was 1000 revolutions per minute.

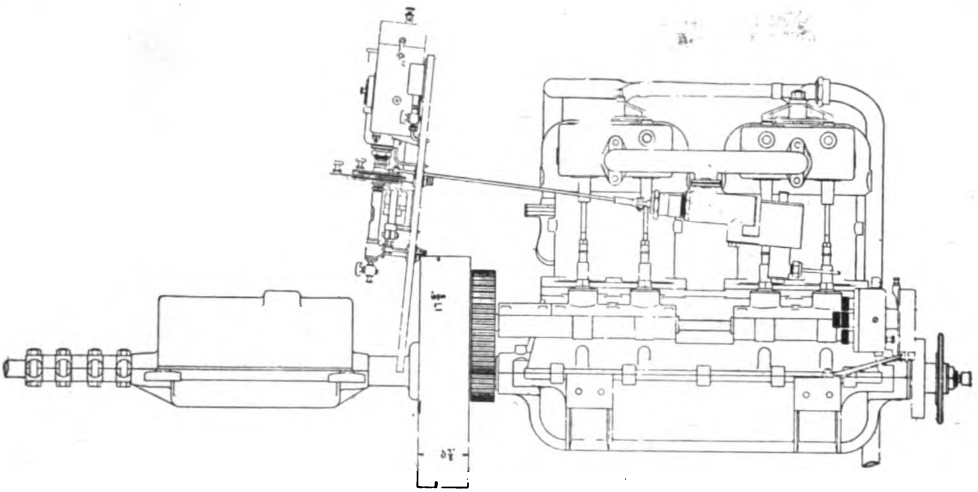


Fig. 2. Side elevation of one of the two 30 H. P. engines of S. & M. 60 H. P. twin-screw power boat.

Duplicating these motors in point of mechanical dimension did not seem to afford any measure of satisfaction, for upon trying them out, between repairing broken parts and breaking nearly every part, no one seemed to arrive at any satisfactory point of vantage for a long time.

It no doubt did occur to numerous of the progressive American designers to test the material used in the good foreign motors, and compare it with the tests of materials used in some American motors, but tests take time, are very costly and after all do not improve the actual material actually used, so that testing is looked upon by many as a tedious, costly and uncertain process with a certain expense account.

The writer and Mr. G. E. Franquist, aided by the encouragement of Mr. J. S. Bunting, not to mention the company's bank balance, went into this matter at very great length, minutely and thoroughly, with the result that to-day the company does not use a pound of carbon steel in any of the parts of the motors, such as crank shafts, gears, and other

The weight of the machinery equipment for this boat will figure up:

Two 30 H. P. motors, 970 lbs.; 2 reverse gears, 280 lbs.; electrical equipment, 90 lbs.; water piping, 42 lbs.; exhaust piping and muffler, 84 lbs.; oil supply—lubricating, 34 lbs.; fuel tank and pipirg, 90 lbs.; miscellaneous, 100 lbs.; total, 1690 lbs.

While this in the aggregate is somewhat more than the weight that ought to prevail in a single 60 H. P. motor, it is not even as much as the actual weight in a large number of actual boats now to be seen. In other words, upwards of 1700 pounds of machinery in a boat of this size and speed is distinctly a triumph in the matter of weight design.

As to the question of endurance that has already been amply demonstrated in the consistent performance of "Simplex I.," "Simplex III.," "Dixie," and some other nickel chrome steel creations, in which light weight, great power and entire freedom from mishaps were the most conspicuous features.

It is unfortunate, of course, that these high grade materials run in to money and require better tools, more skilled workmen and more scientific treatment than ordinary products, but the result should be unbreakable equipment capable of withstanding an enormous amount of abuse.

The hull of the boat of this subject is of the usual Smith & Mabley characteristics, with a thin Mexican mahogany skin, copper-fastened to ribs of oak out of an oak keel of ample proportions, employing natural knees and all the devices of the absolutely up-to-date boat builder aiming at strength, stability and lightness in motor boats, since the speed follows the formula:

49 times the square root of L times the cube root of H. P.÷W=rating, in which

L=length on water line.

H. P.=motor horse power.

W=Gross weight of hull and machinery.

While the skin or planking will be quite thin, i.e., ½ inch in this boat, and while the ribs will be light, the strength will be ample and to spare because of the shape of the hull and the masterly construction, coupled with the fact that every ounce of material likely to be employed will be of the finest seasoned products of the forests of Mexico, Cuba, British Columbia, and our own sturdy American oak.

Cedar will be employed to a limited extent in conjunction with the oak and mahogany, but there will not be a foot of ordinary material in the hull. Time will not be taken in detailing the methods of construction further since by the illustration one may clearly note the features of interest.

In conclusion, it may not be out of place to point out that the propeller will be of manganese bronze as well as all important metal parts throughout the hull construction, excepting the propeller shaft of Tobin bronze. The canopy and curtains will provide privacy when desired and protect the passengers against inclement weather changes.

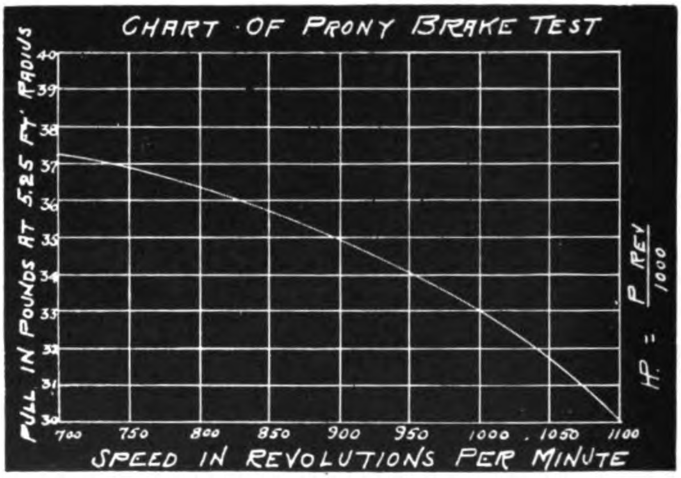


Fig. 3. Brake test of one of the 30 H. P. engines of 60 H. P. S. & M. twin-screw power boat.

It is plain that any weight that can be dispensed with will result in speed, that can not be realized so readily, if at all, in any other way.

In the "Dixie" on her tryout for instance, a difference in weight of about 160 pounds made a difference of over three seconds over a measured course of 1.1 knots.

If weight must be had then, too, one has to consider the location of that weight, whereas if weight can be avoided the trouble of trimming is reduced just in the proportion that the weight is dispensed with, and again if a hull is light and the machinery is also light, it is possible to trim for an advantageous water-line with far greater ease, using but little ballast, or better yet, by locating gasoline tanks, tools and necessities where they will do the most good.

The canopy and curtains are believed to be superior to fixed superstructure work in a pleasure boat of this class, for the intended purpose, since by the use of the canopy and curtains the boat may be rendered entirely open in fine weather at a moment's notice.

It is believed there should be a large field of usefulness for boats of this class, and as may well be imagined all sorts of internal arrangements are possible in a hull of such ample proportions. Yet even so, the speed should be a very great attraction.

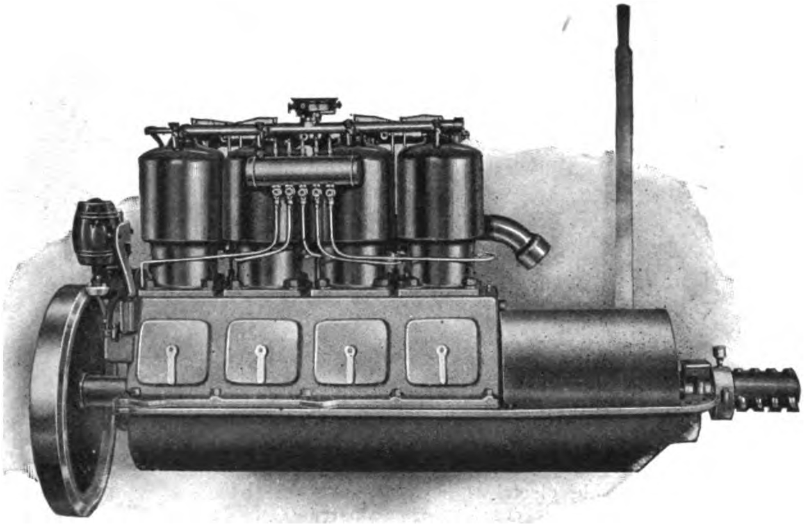
Chicago's First Annual Power Boat and Marine Engine Show will be held at the First Regiment Armory, Sixteenth street and Michigan avenue, for seven days, April 7-14, inclusive.

The officers of the Buffalo Motor Boat Club, which has recently been organized, are Commodore, J. G. R. Glasgow; Vice-Commodore, W. L. Candell; Rear Commodore, Geo. F. Elliott; Secretary, Jesse R. Eccleston; Treasurer, Fred Sherman; Measurer, J. F. Ellsworth; Directors: C. A. Criqui, N. S. Thomas, J. P. Mehrhof, and H. A. Brundige.

It has been announced that the Columbia Yacht Club will enter the power boat field on a large scale, and in addition to holding a number of races for the engine propelled craft during the coming summer will run a big motor boat contest in conjunction with the annual Michigan City race Saturday, June 16.

The New "Speedway" Marine Engine

The 40 H. P. four-cylinder, four-cycle "Speedway" gasoline engine, manufactured by the Chas. L. Seabury Gas Engine Co., Morris Heights, New York City, and shown herewith, has a bore and stroke of six inches, and is fitted with a reversing clutch. This engine is suitable for either pleasure cruisers or working boats.



A Seabury 40 H. P. Marine Motor with Clutch and reverse drum. Dynamo above fly wheel.

The cut represents the standard type, with cast iron base and frame in two separate parts. The cam shaft is on the outside of the frame, and can therefore be taken out easily without dismantling the engine. The cylinders are cast separately, with a pocket on one side for the exhaust valve, which is operated by a direct lift from the cam. The inlet valve, located directly over the exhaust, is opened by a downward push obtained by a reciprocating rod operated by the inlet cam. The rod passing up one side of the cylinder pushes on one end of a lever bracketed on top of the cylinder, the other end of which lever opens the valve. The relative position of the exhaust and inlet valves is advantageous, as the cool, incoming gas is obliged to pass over the hot exhaust valve, thus helping to keep it cool and lengthening its life, by preventing the distortion and deterioration which so often take place from overheating this valve. The pistons and connecting rods of these engines being as light as is consistent with good practice, permit high piston speed with minimum vibration.

All bearings are of ample size, to insure long service and eliminate excessive heating. The valves can be removed and reground by the removal of a few simple parts. The engine is practically oil tight, and no leaky joints are to be found.

The engines are not of automobile design, but have well-rounded cylinders, polished cast-bronze water pipes, inlet pipes, and inlet valve covers. The accessibility of all important parts of the engine is a good feature, and the best of material is used throughout the crankshafts and exhaust valves, being of nickel steel and phosphor bronze, being bushings in the upper end on the connecting rods and in other places where bronze bearings are used. The engine parts are made to jigs as far as possible, thus making it easy to replace parts quickly and satisfactorily. Ball-bearing thrusts are used, and these are carefully protected from water. The larger sizes of these engines are designed to be started by compressed air. Several sizes of two-cycle "Speedway" motors are also built by this company, embodying all the up-to-date devices.

The reversing clutch used with four-cycle engines is of the planetary type. All cut spur gears are of steel of the finest material and used extensively. The friction clutch is of special design and of more than usual power. It is easily manipulated, and so constructed as to receive little wear. Adjustment is simple and quickly made. For high speed boats, where the utmost power possible is required to be developed by the engine, a clutch that is absolutely positive is used, friction not being depended upon to rotate the shaft. This arrangement is a very recent novel design of this company and positively cannot slip.

This company make these four-cycle motors ordinarily in four- and six-cylinders and of horse power ranging from 8 to 150.

The Sagawatha Boat Club, one of the foremost power boat clubs in America, and having 150 active members and 60 motor boats flying its pennant, proposes holding a fair at Baldwinville April 19, 20, 21, the proceeds to go toward furnishing their handsome new club house. A large percentage of the receipts will be obtained by raffling off articles donated by different firms, useful to motor boat owners.

The "Elco" 25-Ft. Electric Launch

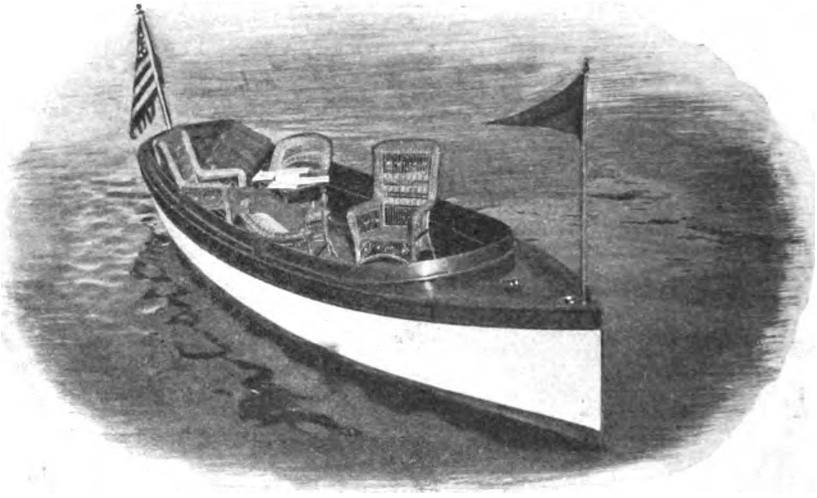
Besides the 35 ft. electric launch described in our February number, page 422, The Electric Motor Launch Co., of Bayonne, N. J., are putting out a new 25 ft. "Elco" launch for 1906.

This 25-foot launch is 6 feet amidships and has a draught of 22 inches. The hull is of cedar with a transom stern, and the batteries of the power equipment are installed beneath the flooring of the boat, thus allowing it to be level throughout and also keeping the weight low in the boat. The power outfit will drive the boat seven miles an hour.

This company is now furnishing its electric craft with a charging motor which makes them independent of outside electrical supplies. This new charging motor consists of a small double opposed hydro-carbon motor. For charging the batteries the power generated in this motor is transmitted to the launch motor, which is changed into a dynamo, therethereby supplying electricity to the batteries. This hydro-carbon motor is operated by either gasoline or kerosene. A small receptacle holding the fuel is carried on board the boat, and when it is desired to recharge the batteries, it is placed on the outside of the deck, thereby avoiding all possibility of fuel leaking into the boat. This receptacle holds enough fuel to give full recharge to the batteries, and the charging motor has enough power to recharge the batteries in two or three hours. A full charge runs the boat about forty miles.

A powerful acetylene searchlight is provided, the gas of which is supplied from a "Prest-O-Lite" tank.

The boat is handsomely equipped with cushions, carpets, and wicker chairs, which seating arrangement is a feature of the "Elco" electric craft. The upper works and interior are fitted with selected mahogany throughout and finished with spar varnish. The woodwork is well rubbed to a high gloss.



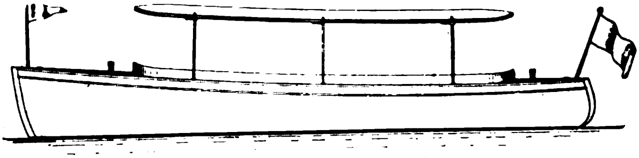
The "Elco" 25-Ft. Electric Launch.

The Matthews 22-Ft- 4 H. P. Launch

The 22-ft. 4 H. P. launch illustrated herewith, is manufactured by The Matthews Motor Boat Co., Bascom, Ohio, whose 31 and 36-ft. boats were described in our March issue, page 378.

This 22-ft. launch is a safe, comfortable family boat with a bow of moderately heavy construction. It is usually equipped with a 4 H. P., 2-cycle, reversible "Rathbun-Lacy" engine which develops a speed of 7½ to 8 miles an hour. It will comfortably seat 18 people. The motor is located aft of amidships, thus allowing ample seating space forward and a comfortable circle seat aft. The tool lockers are placed on both sides of the boat, thus allowing a generous passageway about the machine.

The bow is made with liberal overhang, flaring forward and with plenty of freeboard. Two methods of steering are provided, a bronze steering wheel forward and a steering lever aft on the port side of the engine. Thus one man seated at the engine can control both the engine and the steering. A special feature of this steering lever is the even tension on the cable at all times, whether at mid point or otherwise.

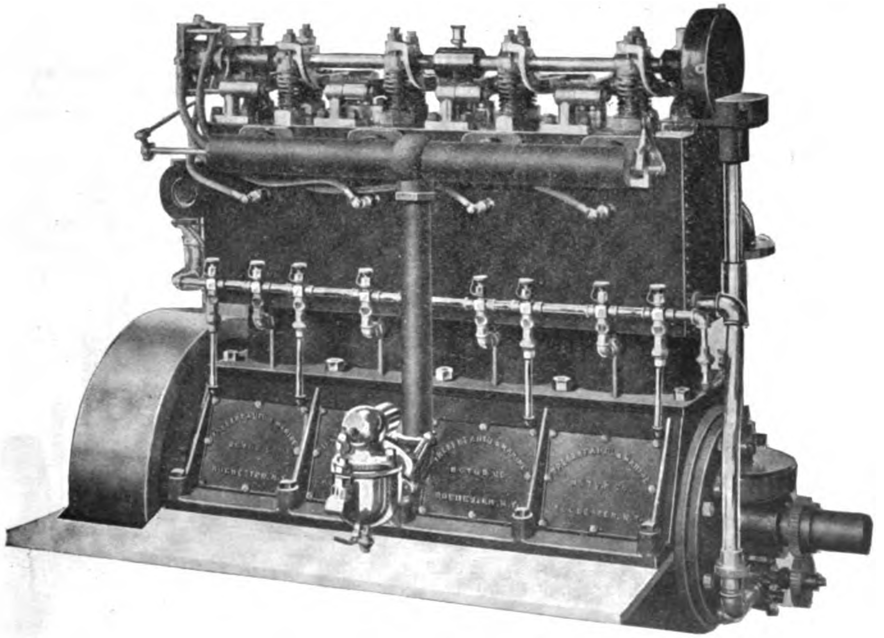


Matthews 22-Ft. 4 H. P. Launch.

The interior fittings comprise linoleum flooring and fabrikoid cork and hair filled cushions. The deck hardware is bronze, all the fittings are for salt water service, and consists of two pairs of chocks, flag pole and sockets, cleats, hatch lift, tow post on both fore and aft decks, and a heavy oak guard rail which extends the entire length of the boat on both sides.

The boat is built of cypress planking with oak framing and the finish of the decks and interior of the cockpit is of mahogany.

The Brownell-Trebert 75-H. P. Marine Motor



Brownell-Trebert 75 H. P. Marine Motor.

The Brownell-Trebert Co., 407 St. Paul street, Rochester, N. Y., successors to the Trebert Auto and Marine Motor Co., have brought out a 75 H. P. marine motor which they exhibited at the motor boat show in New York. It weighs 1000 pounds and was designed especially for lightness, strength and rigidity. One special feature of this new marine motor is the new method of control, which is in the inlet pipe, close to the inlet valves, allowing the maximum and minimum amount of fuel to enter each cylinder, avoiding any condensation in the carburetor, which is never disturbed but left wide open. This allows the motor to run, even without load, at a very slow speed, and at the same time it can instantly be operated at its highest speed and obtain complete combustion without loss of explosions in any cylinder.

The four cylinders are cast in one piece, and bored and polished at the same time, in special boring machines, securing rigidity and perfect alignment. The water jacket is their usual sheet steel casing, which has proven itself entirely satisfactory and desirable, as it greatly reduces the weight, and in no way effects the strength. It also secures the maximum radiation, and scale or dirt can be taken off the cylinders at pleasure. The circulation is of the best, and the water jacket has accessibility for repair or examination, which is impossible when cast with the cylinders. It also obviates the unequal expansion of masses of metal which are directly attached to the cylinders and which often results in straining the cylinders or putting them out of line, thus cutting down the efficiency of the engine.

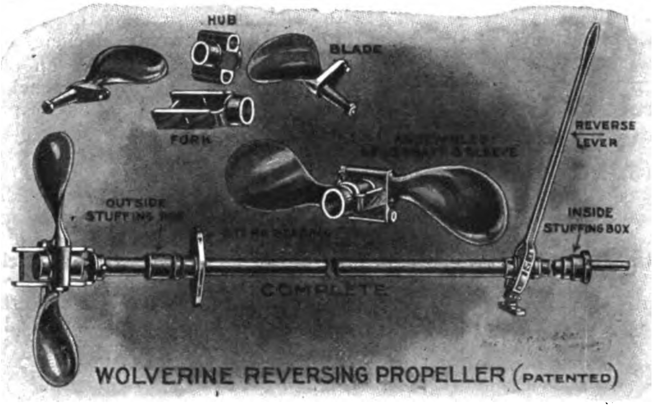
The crank shaft is an oil-tempered, solid, weldless steel forging, enclosed in an aluminum alloy case, which is provided with side openings so conveniently placed and fastened that the crank case can be opened and contents examined at a moment's notice, although it is perfectly oil tight. The mechanically operated valves are interchangeable, and the valve seats and valves are so arranged that they may be easily and quickly taken out and reground if necessary, without danger of getting grinding material in the cylinders. As the inlet openings are placed directly over the spark plugs, the fresh gas being drawn over the points of plugs, keeps them always clean and in good sparking condition.

The severe tests to which the Trebert motors have been subjected when used in first-class racing craft the past season have wholly proven their efficiency.

The annual meeting of the Sagawatha Boat Club was held at the club house at Baldwinville, New York, on Monday evening, February 6 last. Officers were elected, committees appointed, and plans discussed for the coming season. The club has a fine new club house located on the north shore of the Seneca on Genesee street, has 150 members, and boating property exceeding $50,000.

The "Wolverine" Reversing Propeller Wheel

The "Wolverine" Reversing Propeller Wheel, manufactured by the Wolverine Motor Works, Grand Rapids, Mich., is made of the best quality bronze throughout, except the stern bearing, which is babbitted inside.



The "Wolverine" Reversing Propeller Wheels attached to Shaft, Separate and Disassembled.

The parts, which are interchangeable, are accurately put together. The fork and hub are finished on a milling machine and to standard gauge. The blades have the same shape in forward pitch as a solid wheel and when used as auxiliary power for a sailing craft, the blades can be placed in a perpendicular position behind the stern post, thereby reducing the friction on water to a minimum.

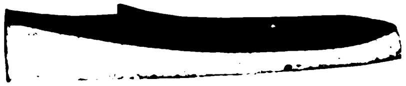
The hub is small and cannot become fouled with weeds or sand, or injured from striking any obstruction. There is no lost motion in the hub or blades.

With this wheel, the operator has perfect control over the boat, which can be run at any speed up to the maximum, and can be stopped within its length when running at full speed. Should the blades become bent from striking an obstruction, they can easily be removed and straightened without disturbing the hub.

The list prices range from $14 for the 10-inch propeller to $50 for the 28-inch. For salt water use, prices range from $1.50 to $10 higher.

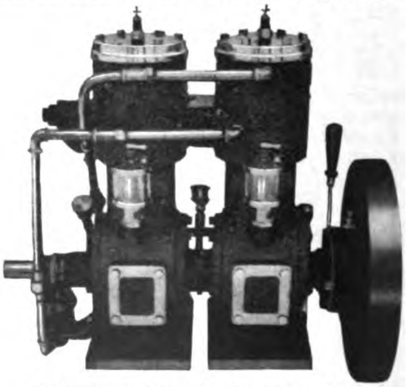
"American 2-Port Engines"

American Gasoline Engine Co., Baldwinsville, N. Y., are making a specialty of light, high speed, 2-port, 2-cycle marine engines, which they claim are as powerful as motors of the 3-port type of the same respective sizes. The motors are manufactured in 1, 2, 3 and 4 cylinder form in six sizes, 1¾x1¾ ins., 3x3 in., 3x3½ in., 4⅛x4½ in, 4½x5, 6½x7 in.; giving ½, 2, 2½, 4, 8 and 15 H. P., respectively. They are jump spark ignited and fed from a special float feed carburetor which is water jacketed to prevent freezing of the vaporizing point. Neither the gasoline nor the air are heated upon entering the engine, and therefore the gases retain their proper density until they reach the compression chamber. The commutator is unique in design and of the wipe contact type, always insuring clean contacts.



"American" motor boat.

The company sell boats complete with motor installed or motors separately. They are building two classes of boats, a roomy, comfortable runabout and a speed launch. The former types are carried in stock in sizes from 18 foot to 40. The speed launches are special and only a few kept in stock, but with the complete equipment of their factory a boat can be made in a very short time.



"American" 2-port 2-cycle marine engine.

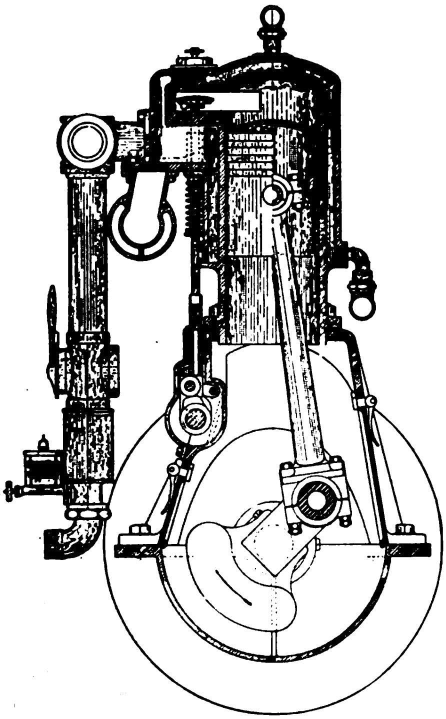
Their factory is a new building and has all the modern machinery for building boats and motors. It is situated upon the banks of the Seneca River, which is a navigable stream leading into Lake Ontario and the Erie canal.

The Racine Boat Co., Racine, Wis., have purchased a large tract of land on which to erect a new and up-to-date building for the manufacture of power boats, etc. This new tract will give them a river frontage of over 100 feet and a depth of 120 feet.

"Jager" Marine Engines

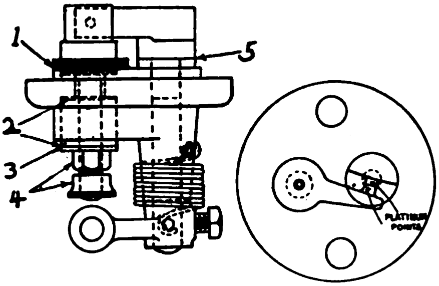
Jager Marine Motor Co., 164-168 High street, Boston, Mass., manufacture an extensive line of gasoline marine engines of high grade construction and correct design. These engines are put out in four types, T, S, U, and R, the same general principles of design being followed in all. Type T includes 1, 2, 3, and 4-cylinder engines of 3, 7, 10, and 14 horse power respectively. Type S engines have the same respective number of cylinders, but develop 5, 10, 15, and 20 horse power. Type U includes 2, 3, 4, and 6-cylinder forms, developing 12, 18, 25, and 40 horse power. Type R engines are made in the same forms as Type U, but in 20, 30, 40, and 60 horse power sizes.

Type R, a cross sectional front view of which is shown herewith, is a heavily constructed engine. Water jackets extend over the entire travel of the piston. The connecting rod is a steel forging finished throughout its entire length. It has a phosphor bronze bushing on the wrist pin end and phosphor bronze boxes of the marine type on the crank end. The crank shaft is also a steel forging, finished all over. It has phosphor bronze bearings, a bearing being provided on each side of each crank. The base is divided by flanges separating the mechanism of each cylinder from that of the other cylinders in multi-cylinder engines. Hand hole plates are placed on both sides of the crank case and each part can be gotten at without disturbing the main parts of the engine.



Cross section of Jager Type R engine looking foreward.

A feature of Jager engines is the Jager Touch Spark Ignitor, shown in detail herewith. In this ignitor both electrodes are mounted on one bronze rustproof casting having a long bearing for the moving part. It is secured to the water jacketed valve chest by only two studs, a beaded copper gasket intervening. Removal for cleaning is readily accomplished without expert assistance. Insulation is well provided for and the construction is simple, so that even an inexperienced operator will comprehend the functions of this device.



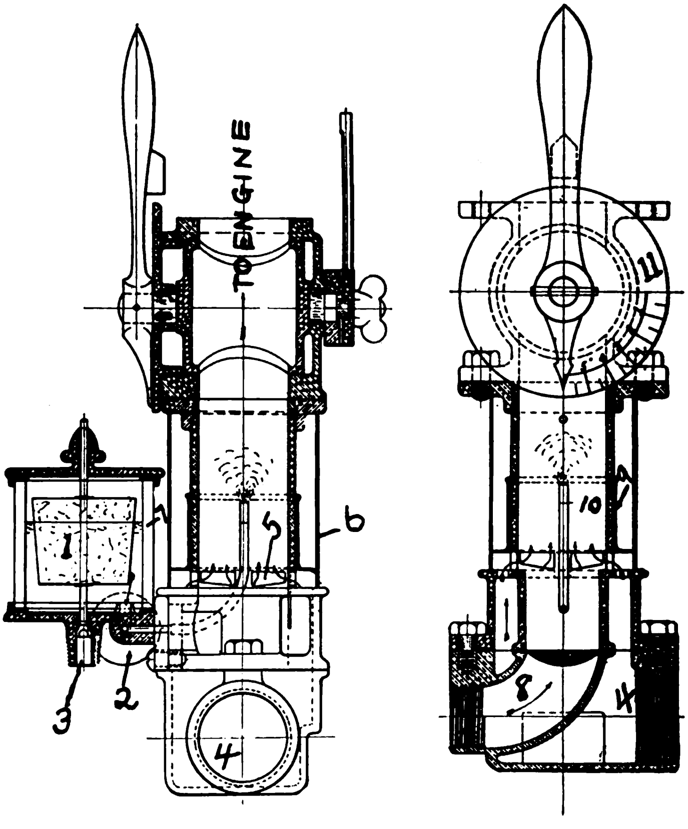
Sectional and end views of the Ignitor used on Jager marine engine. 1, Mica washers; 2, asbestos; 3, lava bushings; 4, brass nuts; 5, ground joint.

In the Jager single cylinder engines the head and valve chest are cast integral with the cylinder, the casting being easily detached from the main base castings, which is in two parts divided along the shaft centre. Valves are mechanically operated and are interchangeable. The valve seats are water jacketed and the rods run in long guides. The fly wheel has no projecting handle. It is a well proportioned disk bolted to a flange integral with the shaft. The water pump is located in an accessible position and stuffing box is provided with a tapped drip so that leakage may be piped off into the bilge of the boat. Pump and piping are of brass. The single cylinder engines are built in three and five H. P. sizes and are furnished with or without reversing mechanism.

The two-cylinder engines are furnished in 7, 10, 12, and 20 H. P. sizes and similar in design to the single cylinder motor. The cylinders are placed close together, giving a very compact engine. The triple cylinder engine is a general favorite, this form giving excellent balance. It is made in four sizes, developing respectively 10, 15, 18, and 30 H. P. The four-cylinder engine is also built in four sizes, of 14, 20, 25, and 40 horse power, respectively, while the six-cylinder engine is made in 40 and 60 horse power sizes only.

They build two types of reversing gear, Type T using bevel gears and Type S using spur gears. Both are rigidly supported on a sole plate, which can be readily fastened to the bed timbers of the boat. In Type T, the bevel gears are not only carefully machined, but each has its teeth generated in a planer. One lever is used to operate it. In the go-ahead position all gears and friction surfaces are locked and the mechanism becomes a part of the shaft. This type is for use with engines developing 1½ horse power for each 100 revolutions of the shaft. It weighs 100 pounds.

The Jager carburetor is another feature of these engines, being void of complicated parts. The fuel flows to a sight feed reservoir, at the bottom of which is a port controlled by a needle valve capable of close adjustment leading the fuel to a bent tube, the upper end of which extends above the level of the gasoline in the sight feed reservoir, this upper or open end standing in the centre of the air supply pipe, which at its upper end leads to the engine. Thus it will be seen that the engine will suck gasoline from the tube and air from the space about the tube at the same time, thus intimately mixing the air and fuel, as the air and fuel openings are fixed the quantity of air and fuel drawn in by the engine must depend entirely upon the suction of the piston, and there are no moving parts to get stuck and fail to work.



Two sectional views of the Jager Carburetor. 1, Cork; 2, regulating valve; 3, gasoline supply; 4, cold air supply; 5, cold air port; 6, jacket; 7, glass sight feed reservoir; 8, warm air supply; 9, automatic sleeve; 10, gasoline level; 11, indicator.

To provide for extreme engine speeds which call for a greater supply of air than can be furnished by the fixed air opening, an auxiliary automatic air supply is provided. This feature comprises a sleeve located outside the central air pipe in such a way as to open and close auxiliary air ports cut in the walls of the air supply pipe. This sleeve is made of a light composition and is loosely fitted, floating on the incoming auxiliary air current. At slow speeds the sleeve is inoperative, resting on a shoulder just above the cold air inlet ports, but at high speeds the more rapid flow of mixture through the passage lifts the sleeves, opening the auxiliary air ports.

To furnish a rich mixture for starting, the air ports are flooded with fuel by depressing the float by means of a starting supply pin, shown at the top of the reservoir. The excess of fuel thus allowed to flow through the bent tube falls from its upper end onto a recticulated diaphragm in the lower part of the air pipe. It is caught and held by the diaphragm by capillary attraction, and therefore interposed directly in the path of the incoming first charge of air. After one or two revolutions the workings of the carburetor are, of course, automatic, only the first charges being unduly rich. Warm air is taken from the carburetor. This carburetor is also sold to other engine makers.

The Type S spur gear reversing mechanism is designed for the most severe duty. One of the special features of this mechanism is the double coil clutch, which is in effect nothing more than a band of phosphor bronze wound round a drum, so disposed that it is self-tightening as soon as the operator applies a light tension with the controlling lever. The effect is very satisfactory, the clutch engaging smoothly and without sticking or binding the working parts. Being made in two parts it is balanced for high rotative speeds avoiding vibration. The reverse clutch is also a phosphor bronze band. This metal develops very

CAMERON B. WATERMAN, Prest. GEO. C. THRALL, Vice Prest. [FRANK R. THRALL, Sec y.

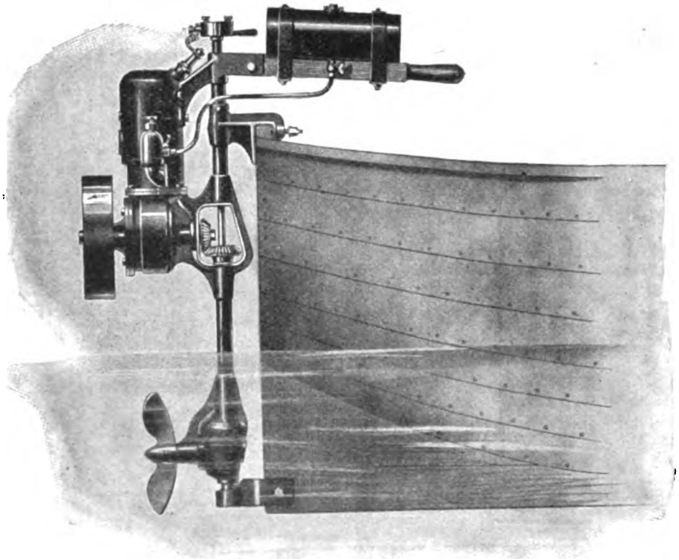
Waterman Out-Board Motor Co.

23 Griswold St., Detroit, Mich.

Sole Manufacturers and Patentees of the

Porto-Motors

(You Carry the Motor—The Motor Carries You)



PRICE, $50.00 No extras

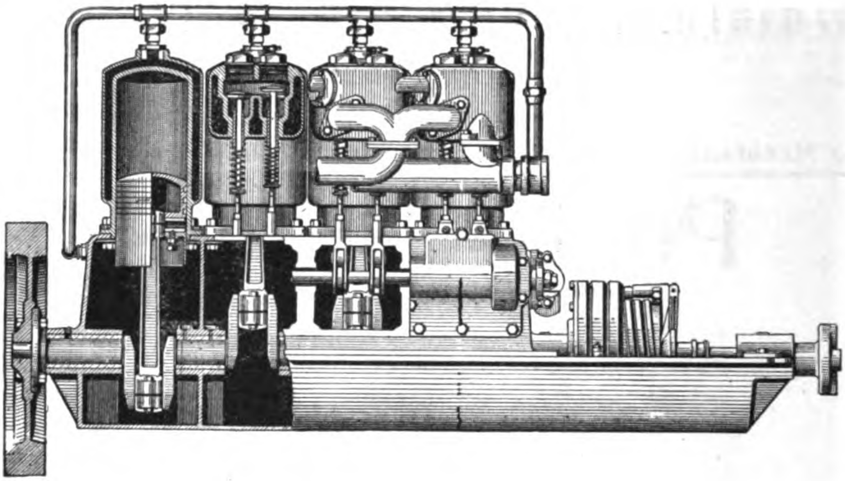
Weight 35 lbs.—Occupies less than 2 cu. ft. of space—Complete with all fittings.

2 HORSE POWER---Thoroughly Practical---Most Compact

Attached to any boat in 3 minutes—no tools required. By operating our own Brass and Iron Foundry and with our own very large and complete machine shop, fitted with the latest automatic machinery and tools, all motors being manufactured complete from jigs, insures every part a perfect fit; and should renewals of any parts be wanted on account of accident in shipping or wear, the parts ordered will always absolutely fit. Bear this well in mind as it is an important matter in the purchase of any machine.

Reference—Old Detroit National Bank—Detroit, Mich.

high tensile strength and stands the severe friction duty without cutting the metal surfaces even when lacking lubrication. One lever controls the go-ahead, neutral and reverse speeds, developing extreme simplicity in operation. Type S reverse mechanism is built for use with engines developing four horse power for each 100 revolutions. It weighs 125 pounds.

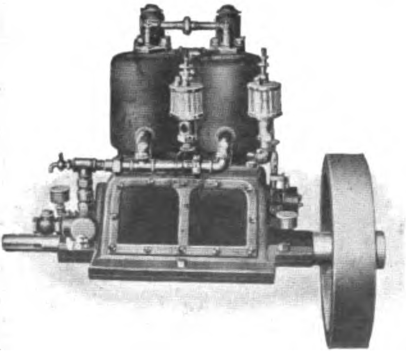


Jager 4-Cylinder Motor, with Reversing Gear Attached.

Schaefer Marine Engines

Marine engines of the four cycle type are manufactured by W. E. Schaefer, Ripon, Wis., in one, two, three and four cylinder forms. Excepting the four cylinder engines, which are of 5 inch bore by 5 inch stroke, they are made in two sizes of bore and stroke, 4x4 and 5x5.

The cylinders and exhaust chambers are water jacketed. The crank case is provided with sufficient opening for examining and taking up the connecting rod bearings. It is split horizontally, the upper half carrying the cam shaft and cams and the lower half the bearings on crank shaft between the cylinders. It is also provided with a partition to keep the oil from following the incline as set in the boat. The plunger pump is driven by the two-to-one shaft, a feature claimed to save wear on check valves in high-speed engines.



Front View Schaefer 4-Cycle 2-Cylinder Marine Engine.

All gears are made of tool steel and the main bearings can be taken up for wear. The crank shafts are made of forged steel. The cams, push rods, ends, valve stems and push rod rollers are made of steel and hardened. All parts are interchangeable. Jump spark ignition is employed and an automatic float feed carburetor is used. All the engines develop their rated H. P. at 600 R. P. M.

The four cylinder engine develops 20 H. P. It has a 2 inch crank shaft, 2x2½ crank pins, main bearings 5½ inches long and bearings between cylinders 3 inches. The balance wheel is 17½ inches in diameter and a 24-inch propeller wheel. It weighs 680 lbs. and lists at $510.

The one, two and three-cylinder 4x4 engines are the same in dimensions, develop 3, 6 and 9 H. P., and list at $155, $290 and $375 respectively. The dimensions are: Crank shaft, 1½ in. in diameter; crank pins, 1½x1¾ in.; length of main bearings, 4½ in.; diameter of flywheel, 15 in.; length of bearing between the cylinders, 3 in.

With the one-cylinder engine is used a 14-in. propeller. It weighs 175 lbs. The two-cylinder weighs 295 pounds and a 16-in. propeller is used with it. The three-cylinder weighs 400 lbs. and an 18-in. propeller is used with it.

The one-cylinder 5x5 engine of the large size weighs 230 lbs. and develops 5 H. P. The specifications are: 17½ balance wheel, 1½ crank shaft, 1½ by 2 crank pin and 5-in. main bearings. The list price is $185.

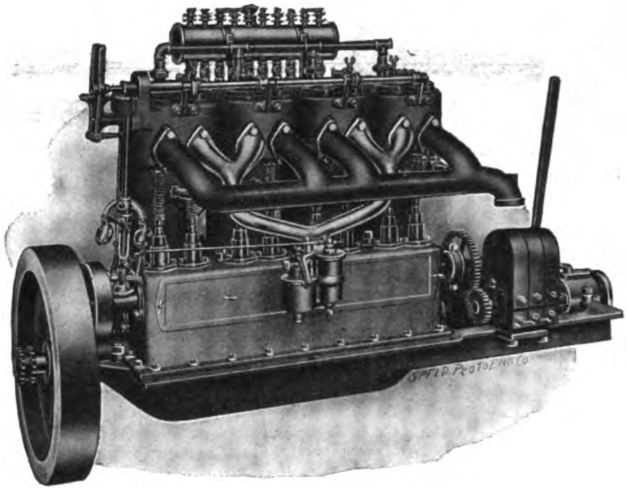
The two and three-cylinder 5x5 engines, developing 10 and 15 H. P. respectively, are the same in specifications, excepting in weight. The two-cylinder engine weighs 430 lbs., has an 18-in. propeller and lists at $365. The three-cylinder engine weighs 510 lbs., has a 20-in. propeller and lists at $440. The specifications of both are: 1¾ in. crank shaft, 1¾x2½ in. crank pins, main bearings 5 in. long and bearings between cylinders 3 in.

Prices include dry batteries, shaft, propeller wheel, stern bearings, stuffing box, and all necessary cups and wrenches.

THE HUBBARD MOTOR CO. SPECIAL

BUILT FOR BOATS OR AUTOMOBILES

We also build one and two cylinder and two cycle engines.



Single Cylinder

1½ H. P.
2½ " "
3½ " "
5 " "
7 " "
10 " "

2 Cylinder

8 H. P.
12 H. P.

16-25 H.P. Rear View

We want good houses as agents. Write for Catalog K.

HUBBARD MOTOR CO.,

MIDDLETOWN, CONN.

Established 1901
Incorporated 1905

The "BATAVIA" 1906 Model

6 Horse Power 4 Cycle Motor

Manf's by **HARRINGTON-WIARD CO.,** Batavia, N. Y., U. S. A

Good Material. Good Workmanship. Good Results

Our Customers Are Our Best Friends

All information regarding prices, &c., of this and other sizes can be obtained by addressing

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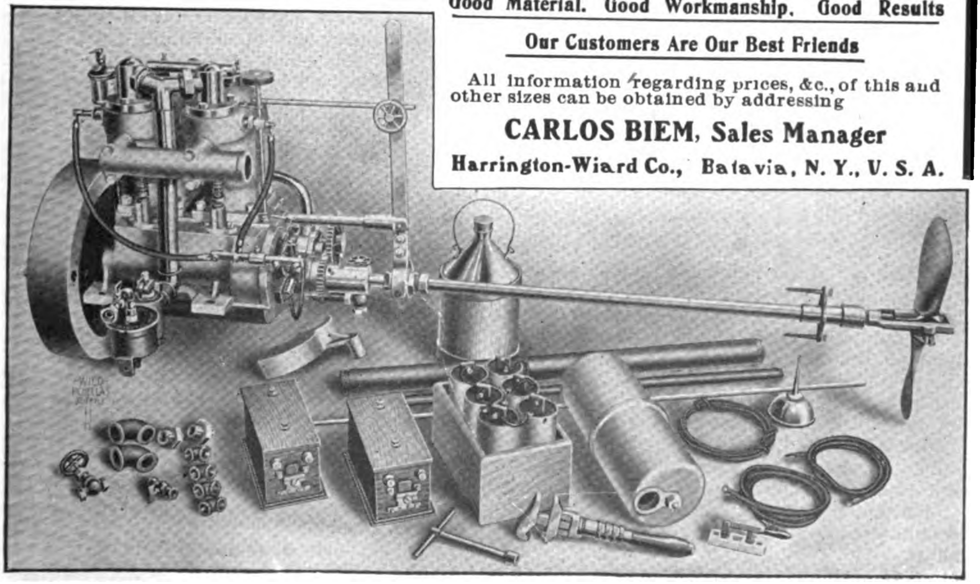
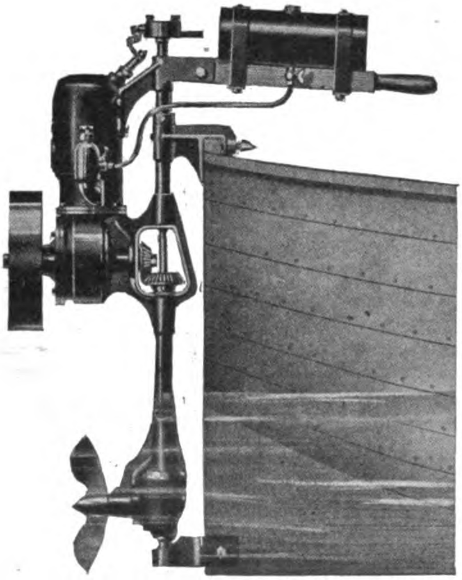


Waterman Out-Board Motive Outfit

Waterman Out-Board Motor Co., 23 Griswold St., Detroit, Mich., have placed on the market a unique marine power outfit comprising an engine with its accessories and a suitable bracket for instantly attaching the outfit to the stern of the boat. The operation of attaching is accomplished without any fitting of parts, the engine being removed without disconnecting anything but one bolt and a clamp which fasten to the stern top and bottom. Besides being a useful power outfit to quickly install in plain hulls it also serves as an auxiliary power for sailing vessels in case of a calm.

The motor is of the 2-cycle type with a 2¾x3 in. cylinder. At 700 revolutions per minute it develops a little over 2 H. P. At this engine speed the 10-in. propeller wheel turns 500 revolutions per minute, driving the boat at a speed of 7 miles per hour. The motor is water-cooled, a centrifugal pump being used to circulate the water. This pump is located in the propeller gear. The motor weighs 24 lbs. without batteries, spark coil and tank, which are packed in the box in which the motor is carried and weigh altogether about 11 lbs. The thrust of the propeller is directly against the sternpost and keel and the weight of the outfit is so distributed between sternpost and transom that there is no undue strain on either. The gasoline tank, of 1 gallon capacity, is placed on the tiller arm. One tank full runs the engine about 10 hours.

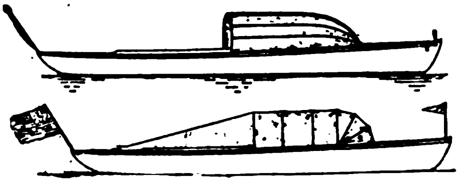

Waterman Out-Board Motor attached to stern of boat.

The electrical equipment consists of five dry cells and vibrator coil carried in box in which motor is stored when not in use. The commutator is carried on top of a vertical shaft. The wiring from commutator, spark plug and ground is carried to a switch on the vertical shaft. Wiring from spark coil and batteries is carried to the same point. By an ingenious arrangement of a split switch the connections are instantly connected or broken at this point so that the wiring is always right and cannot be connected up wrong, even by one who does not understand the electrical connections of a gasoline motor.

The entire outfit comes packed in a nice dovetail box with hinged lid and clasp for lock. As it only weighs 35 lbs. it can be taken on an outing and shipped as baggage, providing one's own power boat whenever a skiff can be obtained. It will accommodate itself to varying heights of stern or transom from 16 to 26 inches.

"Standard" Spray Hoods

Robert E. Morton, of New York City, manufactures a line of spray hoods under the trade name "Standard." These hoods are made of the best grade of most suitable materials and are designed to fit properly and give good service. The appearance of these hoods on a boat is illustrated by the accompanying cut.


"Standard" Spray Hoods on a boat.

Launch Fittings and Motor Boat Supplies

A. S. Morss Co., 210 Commercial St., Boston, Mass., job a complete line of marine supplies, making a specialty of launch fittings. One of their specialties is the Boss awning fastener, described in our June, 1905, issue, page 152, for which they are selling agents. They issue a very comprehensive catalogue, in which all articles are conveniently indexed.

Marine Motor Catalogue

The Mianus Motor Works have just issued a new illustrated catalogue, describing their improved marine gasoline engine for 1906. It also contains a full list of fittings and supplies for gasoline engines. In the back of the catalogue is a complete illustrated list of repair parts. Every article is fully described and clearly illustrated by half tone engraving or line drawing. Weight, sizes, net prices, and catalogue number are given in the descriptive matter.

The British Motor Boat Club will have racing fixtures for the coming season at Oulton Broad on June 5, Liverpool on June 8 and 9, Cowes during the August week, and at Burnham in September.

A tournament for almost every type of automobile will be held Easter week on the Atlantic City beach under the auspices of the Atlantic City Automobile Club. Special opportunity will be given 1906 models for a speed test, driven by professional drivers or others.

REGAL

MARINE ENGINES

Four cycle—jump spark ignition—Automobile type. Have the **smallest number** of working parts consistent with a perfect operating motor. Our valves insure perfect mixture. Ignition system is like an automobile, and motor **starts with one turn.**

Regal Engines are fully guaranteed.

"THEY ARE BUILT TO RUN AND DO IT"

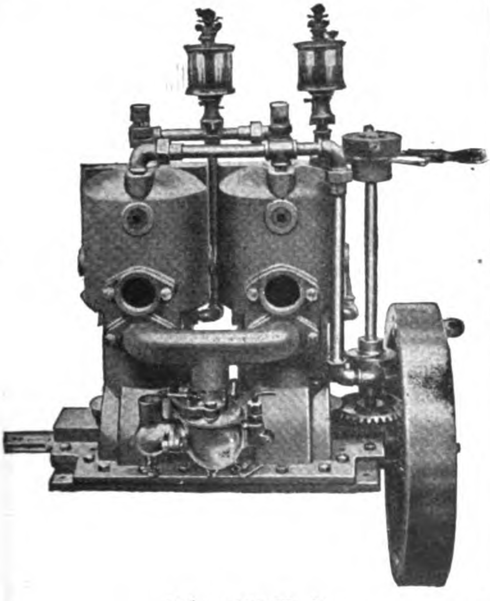
Our customers say we are the only manufacturers who put GOOD WORK into a SMALL ENGINE. Made in 3 types, 1 1-2, 3 and 5 H.P.—single cylinder; 8 to 15 H. P. double cylinder; 30 H. P. 4 cylinder.

SEND FOR OUR NEW CATALOGUE—it shows all the latest designs—tells interesting things about gas engines. Mailed free.

REGAL GASOLENE ENGINE CO., 51 W. Pearl St., Coldwater, Mich.

Two and Four Cylinder

Marine Engines



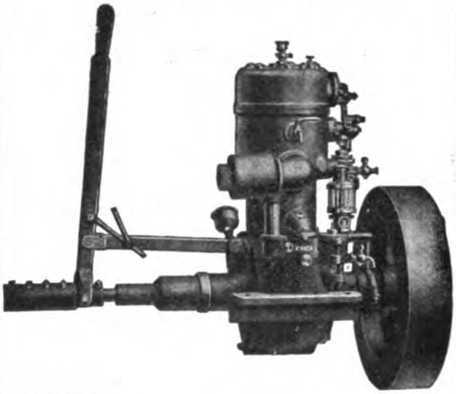
1½ to 100 H. P.

Brown-Talbot Co.

Salem, Massachusetts.

Knox Gasoline Motors

MARINE AND STATIONARY



MARINE

2 cycle, three port, 1½ to 13 h. p.
4 cycle ....20 to 40 h. p.

STATIONARY

2 cycle type..................2 to 6 h. p.
4 cycle type ....4 to 18 h. p.

STRONG SIMPLE RELIABLE

SEND FOR CATALOG

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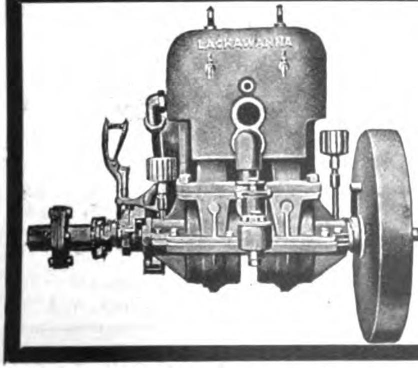
ROCKLAND, ME., U. S. A.

Branches: **Boston, Mass., 87 Washington St., N. New York City, N. Y., 124 Broad St.**



The Lackawanna Valveless Reversible Gasoline Motor

comprises everything in up-to-date gas engine construction. Is simple, reliable, durable, easy to start, easy to operate, requires no reversible blade propeller or reversing gear.

Write for Catalog D.

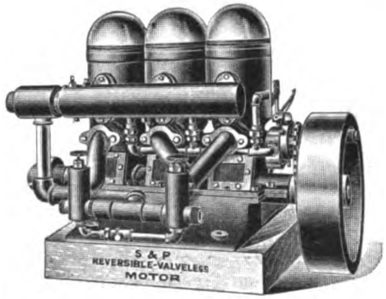
Lackawanna Manufacturing Co.

NEWBURGH, NEW YORK

POSITIVE SPEED CONTROL
EASILY AND QUICKLY STARTED
YOU CAN REVERSE IT WITH TWO FINGERS

MANUFACTURERS

SITTMANN & PITT
No. 326 State St.
BROOKLYN, N. Y.



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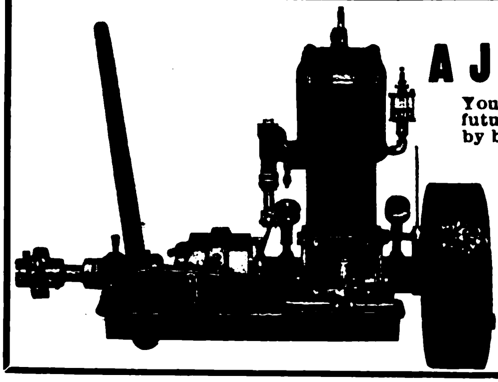


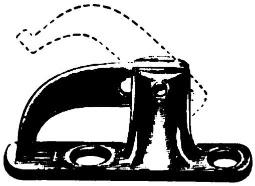
IF YOU ARE
A JUDICICUS BUYER

You will keep in mind your own welfare and future pleasure, when you buy a marine engine by buying only the **BEST**.

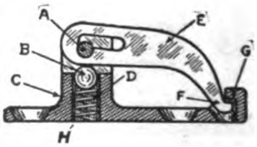
THE WATKINS MARINE ENGINES

embody all those good points that are so essential in a high grade machine. Our new catalog describes them fully. It is free. Send for it to-day.

THE FRANK M. WATKINS MFG. CO.
528-538 Baymiller St., - - CINCINNATI, OHIO



The Boss Awning and Cover Fastener



for boats, automobiles and wagons. Polished brass.

The only fastener which makes it impossible for your cover or awning to come unfastened. Has great strength and durability. May be fastened either to wood or to the canvas itself.

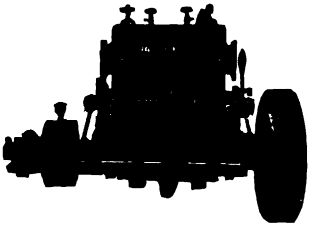
LIST PRICE, $1.00 DOZEN. Most complete line and latest patterns in

LAUNCH FITTINGS

Send five cents in stamps for 450 page catalog, ready April 1st.

A.S. MORSS CO., 210 Commercial St., Boston, Mass.

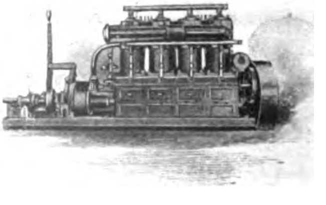
TOQUET MARINE MOTORS
ARE PLUS MOTORS
I. E. they develop more than rated power.



2 H P. Develops 3 H. P.
3 H. P Develops 4½ H. P.
5 H. P. Develops 6 to 7 H. P.
8 Develops 10 to 11 H. P.
16 H. P. Develops 25 H. P.
30 H. P. Develops 40 H. P.

all sizes in stock from 2 H. P. to 100 H. P.

The TOQUET MOTOR CO., 314 Fourth Ave., New York.
G. Eduard Shaw, Gen. Mgr. MEMBER N. A. E. & B. MFGS.



Marine Outfit Type "F" 50-70 H. P. 4 cycle-4 cylinder Mohler & DeGress Light Weight, High-Speed Auto and Marine Motors.

Write for catalogue of different types—3½ H. P. to 50-70 H. P.

F. A. SEITZ CO., Manufacturers,
143-153 Frelinghuysen Ave., Newark, N. J.

It's better to buy a Truscott
than to wish you had

You Can Tell a Truscott–You Can Trust One

Its original cost is no higher than inferior makes; its maintenance much lower. The automatic control saves gasoline, wear and tear, time, trouble and expense. The owner of a Truscott is always sure of running his boat at will, for his own and his friends' pleasure. Send stamps for catalogue. Our quarterly, "The Launch" is Free.

TRUSCOTT BOAT MFG. CO., Dept. 268 St. Joseph, Mich

ANTI-CORROSIVE
REGISTERED IN PATENT OFFICES
UNITED STATES
CANADA
AND GREAT BRITAIN.
GAS ENGINE
LUBRICANT
MANUFACTURED
ONLY BY
E. H. KELLOGG & CO.
N^{os} 243 & 244 SOUTH ST. NEW YORK, U.S.A.

IS THE BEST FOR

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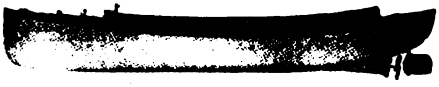
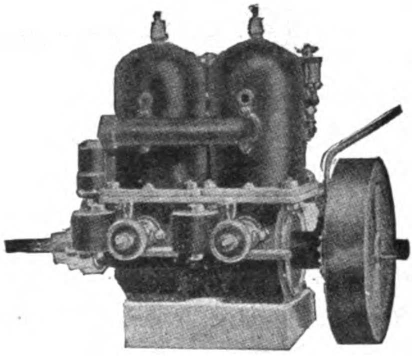


18 ft. 3 H. P. $200.00

LAKE SHORE ENGINE WORKS

MARQUETTE,
MICH, U. S. A.

See our exhibit at the National Motor Boat and Sportsman's Show at Madison Square Garden, N. Y. City, February 20th to March 8th.



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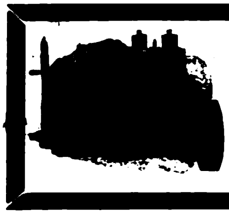

THE MIETZ & WEISS
MARINE OIL ENGINES 3½ TO 100 H. P.
Stationary Oil Engines 1-70 H. P. Kerosene or Fuel Oil Used.
Simple, Safe, Reliable, Self Ignition.
anufactured by
AUGUST MIETZ, IRON FOUNDRY AND MACHINE WORKS
Send for Catalogue. 128-138 MOTT ST., NEW YORK.

$49 2 Cycle 3-Port **Little Giant** GASOLINE MOTORS U. S. Patent, No. 609,255
BARE ENGINE
(Dwarf in size—giant in strength)

H. P. 4 to 5. Weight 150 lbs. Height 17 in.

SIMPLE and easy to operate, only three moving parts, no gears, valves or springs—nothing to get out of order. Built for service. MAIN BEARING BABBITTED Jump Spark and Reversible Speed Lever Control. Send for descriptive catalog. "D" of the other sizes. Agents wanted.

Cable Address:
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UNITED MANUFACTURING CO., Detroit, Mich., U. S. A.
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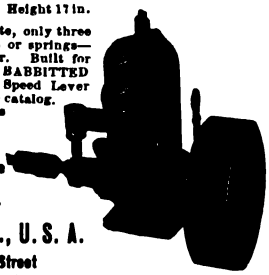
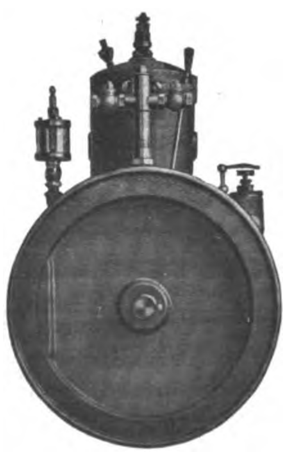


The CARLSON Motor
Price $850 25-30 H. P. Weight 300 lbs.
It's an improved type of motor.
Send for particulars. Agents wanted.
CHAS. A. CARLSON
1060 Bedford Ave., Brooklyn, N. Y.



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Complete Outfit with Propeller Coil, Plug and Batteries.

$75.00 Net

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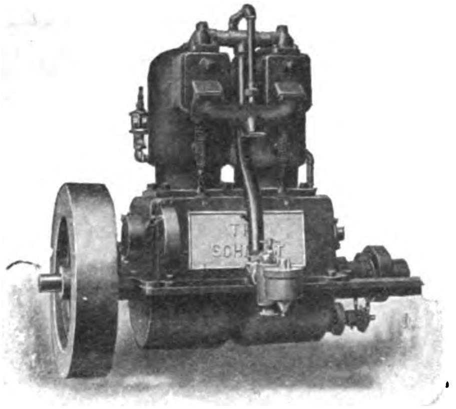

Schmidt Marine Engines

More Power *Built for all*
Less Trouble *kinds of service, in all kinds of weather. Does not depend on high speed for Power, has ample bore and stroke.* *Mfgd by*

Minn. Boat & Power Works
Stillwater, Minn.

NOTICE

Do not think because an engine is cheap it is no good. All engines are made out of cast iron and cost the same per pound. Some concerns made 100 engines in a year. We make 3,000 with perhaps the same office expense, so you see it is the quantity that enables us to cut off the fancy price and sell them at the price they should be sold at.

Write for Catalogue.

THE DuBRIE MOTOR CO.
34 BRUSH STREET DETROIT MICH., U. S. A

MOTOR BOATS

Knock-down Frames, etc.
Launches from $700 up.
Send for catalog and prices.

F. P. NEUMEISTER, Rockford, Ill.

High Grade 4 H P., 4 cycle **MARINE ENGINE** complete with all fittings, reversible propeller, for a short time only, $89.00. Have many other sizes, state your want.

A.J. Houle Motor Wks. 58 S. East St., Holyoke, Mass.

Air and Water Cooled

Marine and Auto Engines

Four-cycle, one to eight cylinder, 2 to 90 H. P.
The Hub Patented Reverse Gear and Planetary Transmission.
Catalog mailed on request.

THE HARVARD MARINE & AUTO CO., 25 Eliot St., Cambridge, Mass.

1½ H. P.—$48.00. Best engine made. Notice the round base which insures higher base compression which means more speed and more power. Only three moving parts. So simple that a child can run one. Send for catalog C. Dealers write for agency.

The Burdick-Putnam Gasoline Engine Co.
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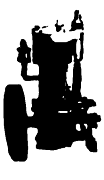
The Cycle & Automobile Trade Journal



THE "DUNN" MARINE MOTOR $42.50 FOUR CYCLE REVERSIBLE Outfit Complete

This high power 4-cycle motor with bet-coil, batteries, shaft, screw, tanks and muffler, tested ready to install in skiff or launch. Weight of motor 100 lbs. I also build two and three-cylinder stationary motors.

Bore 3¾ in. Stroke 4 in.
1¾ H. P. actual.

WALTER E. DUNN
OGDENSBURG - NEW YORK

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2 H. P. Boat Motor only	$43	net
Set castings for above	$10	"
1½ Bicycle motor cstgs.	$6	"
2¼ " " "	$7.50	"
Vibrator coil and plug	$5.75	"

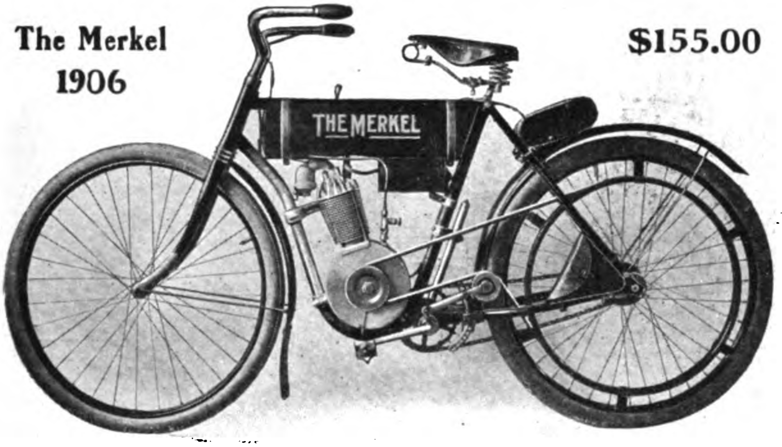
All Guaranteed.

R. H. PUTNAM, 3 Walnut St., Springfield, Mass.

The MOTOR CYCLE of To-day

The Merkel
1906

$155.00



The easiest riding motor cycle on the market. Has all the most up-to-date improvements, including a

SPRING FRAME AND RIGHT HAND GRIP CONTROL

The former insures a smooth, even ride over the roughest roads and the latter, perfect control of machine at all times. RECOMMENDED and USED by physicians. The original and only SPRING FRAME motor cycle.

Catalog giving details, mailed upon request. Agents wanted.

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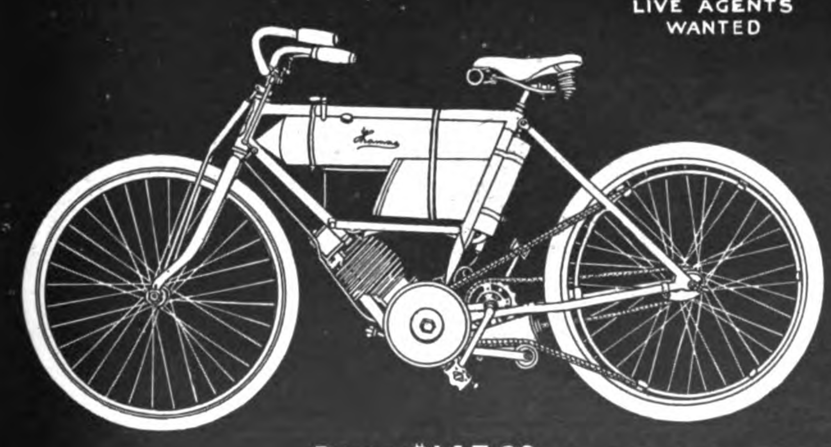
THE
THOMAS AUTO-BI
NO. 44

LIVE AGENTS
WANTED

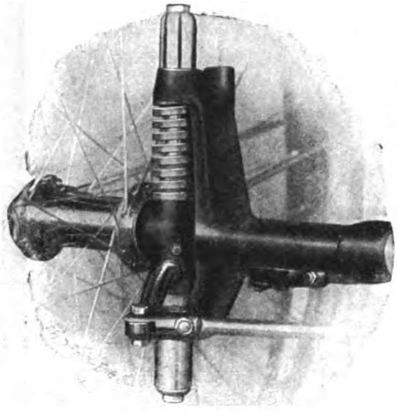


PRICE $145.00

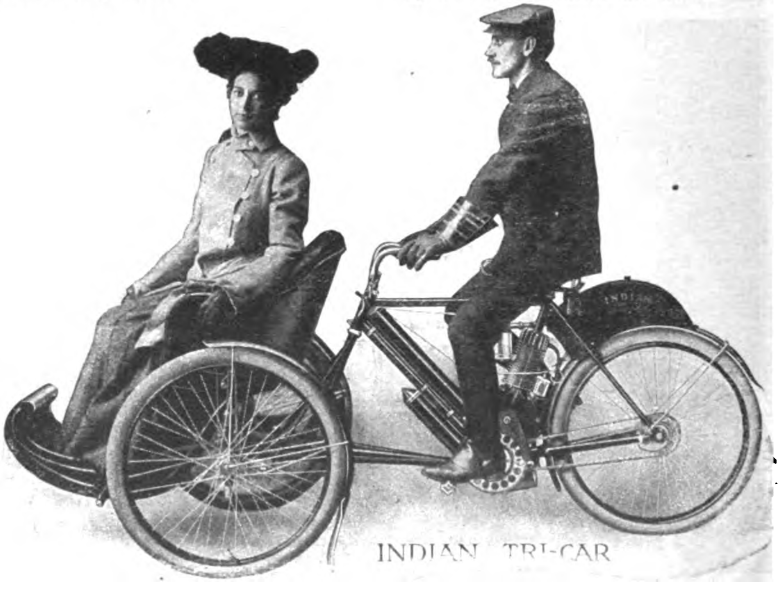
The Thomas Auto-Bi-Co.
1453 Niagara St. Buffalo, N.Y.

1906 Features of Indian Motor Cycles

The new features of the Indian motor cycles, manufactured by Hendee Mfg. Co., Springfield, Mass., for 1906 are chiefly improvements in minor details which provide more power, quietness, and comfort, the latter being especially noticeable in the three-wheel motor cycles, which are provided with independent helical suspensions on the two front wheels. In the 1906 Hedstrom motor the power has been increased from 1¾ to 2¼. This motor measures 18 inches high, weighs 32 pounds, and has a bore and stroke of 2⅝ and 3¼ inches, respectively.



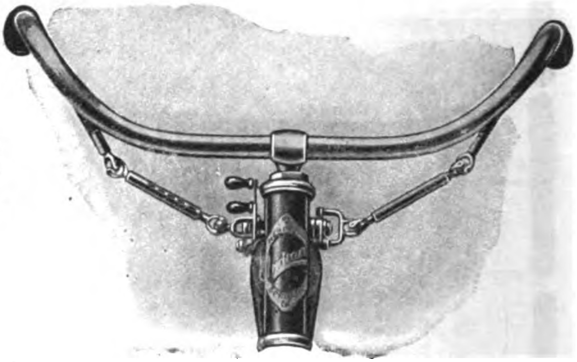
Indian Independent Helical Suspension used for Tri-Cars and Delivery Vans.



The Indian Tri-Car Attachment.

The cooling flanges are machined integral with the steel cylinders, the heads of which are cast separately. The connecting rod is a steel forging and the piston grey iron fitted with two rings. The 14-pound fly wheels are made of cast iron. All bearings are of special bearing metal and the enlargement of the motor and the use of large tires has brought about a general widening of bearings and bearing surfaces that affords increased strength and durability. The tires used on the 1906 Indian are 2¼ in. instead of 2 in.

The lifting mechanism of the exhaust valve has been improved, which gives more efficient valve operation.

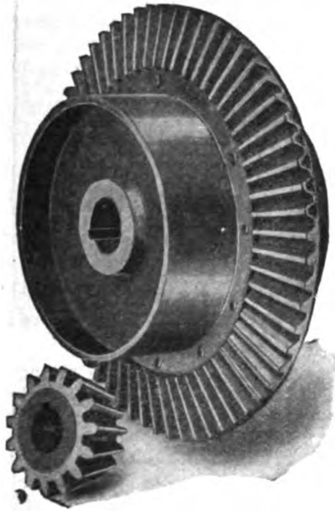


The Indian 1906 Double Grip Control.

The Hedstrom mica spark plug is used. This plug has proved so entirely satisfactory that it is adopted as standard Indian equipment.

On the 1906 Indian an improved double grip control is employed. The right grip operates the spark and exhaust valve and the left grip the throttle. The right grip starts and stops the machine and regulates the speed up to twenty miles an hour. This double grip system is ingeniously simple, consisting merely of a flexible shaft inside the handle bar tube connecting with each grip, and coupled to universal joints and telescoping shafts. The shafts are secured to yokes which actuate the rods, one connected with the throttle

BROWN-LIPE GEARS



Differentials for chain and shaft drive

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BROWN-LIPE GEAR COMPANY, 206 S. Geddes St., Syracuse, N. Y.

Our Leather Covered FENDERS

Are superior to all other kinds.
They do not rattle.

Leather License Placards

McKinnon Dash Company

Troy, Ohio
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BUFFALO, N. Y.

St. Catharines,
Ontario

and the contact breaker, and the other with the sparking device and exhaust valve lift. The Indian is also provided with an emergency control, for use in case severe accident should disable the grip control. It is operated by the two small handles on the right side of the head of the machine.

The independent helical suspension, which is used on the two parallel wheels of three-wheel Indian motor cycles, is so constructed as to allow each wheel to be flexibly independent of the other and free to conform to any unevenness of the roadbed without regard to its mate, the finely tempered spring permitting each wheel to yield sufficiently to preserve the equilibrium or even balance of the whole machine. When one wheel is deflected by an obstacle or depression the other is not deflected, nor does it receive the attending shock, as a result the usual tendency of three-wheel machines to veer around, to tilt sideways, capsize, or yank the handle-bars out of the driver's hands, is eliminated.

The tri-car attachment lists at $125, and is proportioned for real comfort. It is made of aluminum and the cushion springs and sides are upholstered in tufted dark blue leather. The springs upon which the seat is mounted gently yield backward and are very comfortable.

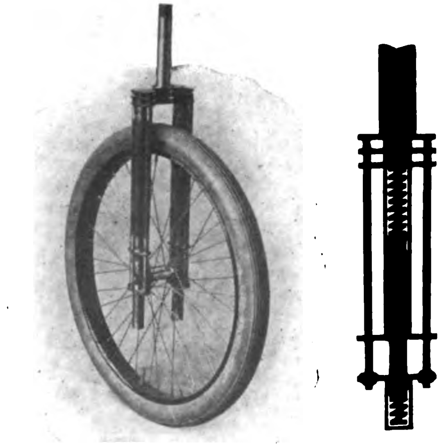
An attractive feature of the tri-car is its convertibility as a fore-carriage, or delivery body, can be attached, or the machine be used only as a motor cycle.

The 1906 Indian racing motor cycle is equipped with a four H. P. double cylinder motor, weighs 108 pounds and lists at $350.

The Indian delivery van is described in the commercial vehicle department of this issue.

The Hornecker Spring Fork

The spring fork, marketed by the Hornecker Mfg. Co., Whiting, Ind., who manufacture the "Torpedo" motor cycle, is of very strong construction, and has a cushion device in each side of the fork, which eliminates all shocks and jolts.



Complete and Sectional View of the Hornecker Spring Fork.

Referring to the accompanying illustration, each side part comprises three uprights, two rods, and a tube in the middle, which is open between the two lower crossbars, where the axle plays up and down, braced at the shoulder by three crossbars and near the axle of the wheel by two crossbars. In this tube are two push springs between which works a bar, near the lower end of which and between the two crossbars or guiders is fastened the axle. These two guiders prevent any side motion of the wheel.

An important point is the ease with which steering is accomplished, as the weight bears down to the axle on a straight line.

The wheel can be easily removed by simply removing the nuts that hold the lower brace in place when the bars holding the axle can be parted sufficiently to allow removal of the axle.

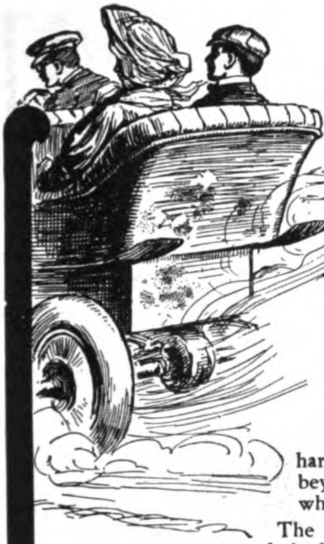
Cannot Keep Motor Cycles off the Streets

Some months ago we drew the attention of our readers to the ordinance passed by the Reidsville, N. C., town council, prohibiting the use of motor cycles on the town streets. David L. Carroll, a resident of that town, who owned a motor cycle, joined the Federation of American Motor Cyclists, and under the direction of the Federation's legal adviser, John C. Higdon, was arrested and fined under the ordinance. The case was appealed and has been pending for several months, and finally was disposed of on March 2 by the Superior Court of Rockingham County, and the court ruled that the Reidsville ordinance was clearly unconstitutional and could not prevail, the judge stating that "no law can be passed that prohibits the use of motor cycles on the public streets and highways." This case is the first instance in which the right to use motor cycles on the public highway has been denied, and the F. A. M. officials are to be congratulated upon their speedy victory.

N. Y. 1906 Motor Cycle Events

Representatives of the New York and Brooklyn Motor Cycle Clubs recently met and arranged a schedule of events for the coming season as follows: April 22, N. Y. Club's spring century run; May 6, Brooklyn Club's spring century run; May 30, N. Y. Club's annual hill climbing contest; July 4, Brooklyn Club's 250 mile endurance contest on Long Island provided this date does not conflict with the F. A. M's. arrangements for its annual contests. Besides each club will hold runs, etc., on Saturday afternoons and Sundays during the season.

The Chicago Motorcycle Club has applied to the Federation of American Motorcyclists for the National meet, including the championship contests of the Federation. The application states that it is assumed that the annual endurance contest will be held, as formerly, in connection with the meet, and the Chicago clubmen suggest that the route from New York to Chicago be selected for the run. Secretary H. J. Wehman of New York has also received an applcation from the Rochester Motorcycle Club.



Clean Up With

the wonderful new cleanser

MOBO

During a long run, the mud and dirt is bound to dry and harden on the machine. If rubbed off—the surface is scratched beyond redemption. If simply washed off—ugly stains remain which are likewise unremovable outside of the paint shop.

The only way to thoroughly clean the car, and at the same time preserve the lustre of the highly polished surface, is by using Mobo. A pure vegetable oil product which quickly removes grease and dirt of any kind. Prevents blistering and cracking of the paint and varnish. Can be used on harness and leather goods—also woolen fabrics. So harmless that it will not injure the most delicate skin.

Put up in 2 lb. and 8 lb. cans; also in tubs, half barrels, and barrels. If your supply house does not keep it, send us his name and address—we will see that you are supplied.

JOHN T. STANLEY, 646 W. 30th St., New York.

"Favorite" Bicycles

Adult and Juvenile For 1906

Our proposition will convince you where to place your business

The Fittest Has Survived

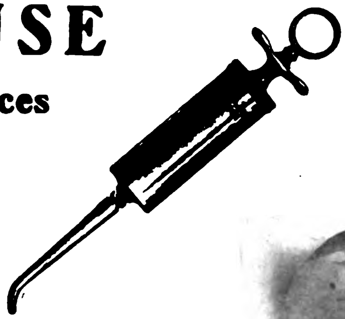
THE TOLEDO METAL WHEEL CO., **TOLEDO, OHIO.**

B-LINE OIL GREASE GUN

BEST MADE FOR

AUTO USE

Send for Prices



Made entirely of METAL, One-hand manipulation. Handles Oil, Gasoline or Grease. Cannot get out of order.

ELECTROS
READY
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TRADE-MARK

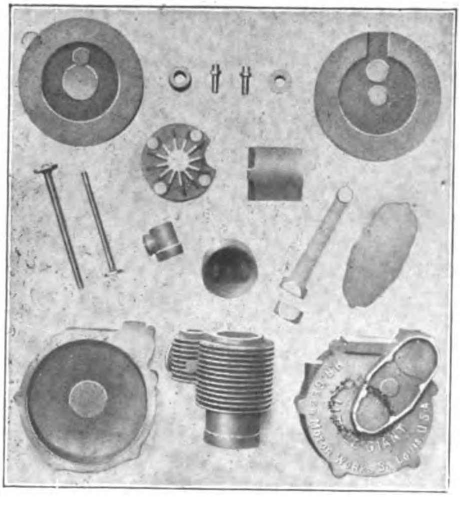
The Auto Department of

The RANDALL-FAICHNEY COMPANY OF BOSTON, MASS.

GET BUSY THIS SPRING

Build your own motor cycle. We furnish the material—you do the work

This set of 2¾ H. P. Castings, $12.00



- Spark Coils
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- Belts
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- Specialties

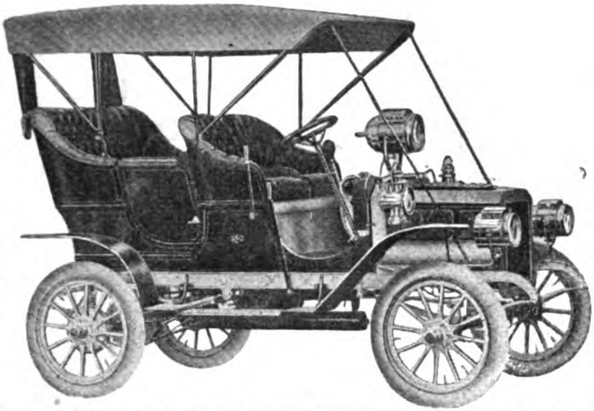
Second-hand motor-cycles from $40.00 up. Send for list No. 102, of seventy machines. Our 1906 catalogue of motor-cycle supplies is ready and should be in the hands of every motor-cycle dealer, rider and prospective purchaser.

SEND FOR IT

We have other sets of castings from 1¾ to 5 H. P. for motor-cycles and marine engines. Air or water-cooled; single or double cylinder. GET BUSY. GET OUR CATALOGUE.

HARRY R. GEER CO., 1016 Pine Street, St. Louis, Mo.

Motor-cycles and Supplies exclusively.



REO

$1250 The Positive Car

REO Touring Car

16 horsepower. 1,600 pounds; 90-inch wheel base; 5 passengers; side-door detachable tonneau; speed 35 miles per hour. $1,250.

Both in make-up and performance REO cars are positive clear through.

Begin with the double opposed motor's long six-inch reaching stroke, pushing the car up-hill with a steady, powerful, positive drive unequalled in any other motor of its rating or price. Take the positive gear-pump cooling system with its ingenious sectional radiator which positively cannot be put out of action by freezing or any ordinary damage; the positive-acting springless commutator; the positive force feed oiler, forcing an exact measured charge exactly where and when it is needed; the positive valves, carburetor and commutator; all gears, joints, bearings and connections absolutely strong, smooth-acting and certain—Not anywhere dependence upon gravity or uncertain pressure. But every part positively performing the positive and certain work for which it was designed.

No wonder that REO cars stand first among positive performers and positive cup-winners.

REO-graph showing the inside of a typical motor in actual moving operation, sent to you for 6 cents in stamps addressed to Dept. 145.

REO Motor Car Co., **SALES DEPARTMENT, LANSING, MICH.**
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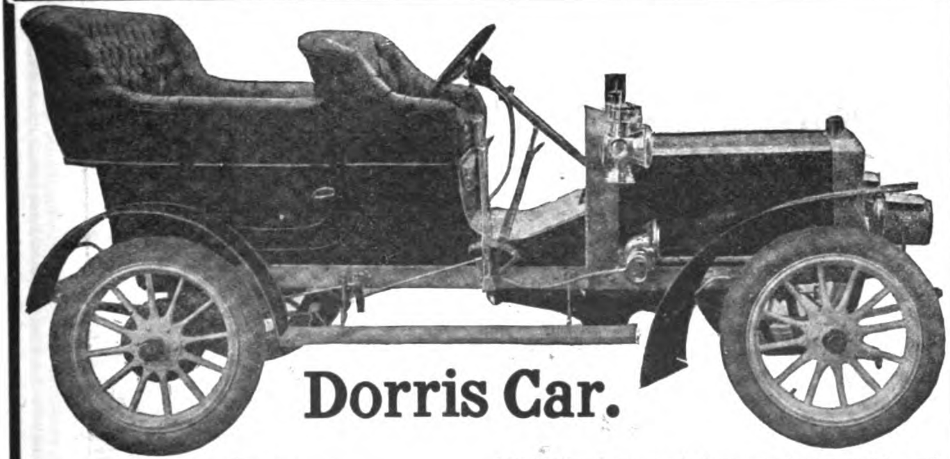
Agencies throughout the United States



Dorris Car.

PRICE, $2,500	Ready for the road
HORSE POWER	30 actual
MOTOR	4-cylinder, vertical, 4¼x5
VALVES	In head and interchangeable
CYLINDERS	Ground
CLUTCH	Multiple disc, running in oil
FRAME	Pressed steel
FLYWHEEL	22 inch, with fan
PUMP	Direct driven
SPRINGS	Semi-elliptic in front, platform in rear
RADIATOR	Large, of finned tube variety
STEERING GEAR	Rack and pinion
CONTROL	On steering column
DASH	Hollow pressed steel
WHEELBASE	101 inches
CAMSHAFT	One piece

IGNITION	Jump spark, by storage battery and dry cells
CARBURETER	Float feed variety
OILER	Mechanical, with individual feeds
FRONT AXLE	I beam, Timken roller bearing
REAR AXLE	Bevel gear, Timken roller bearing
WHEELS	1½-inch, second growth hickory
TIRES	32x4, any standard make, including Continentals
TRANSMISSION	Sliding gear, nickel steel and hardened, 3 speeds forward and reverse
BRAKES	Three very powerful
LAMPS	Two gas, two side and large tail
BODY	Very stylish, made in our own factory; comfortably seating five
WEIGHT	2,200 lbs.
GASOLINE TANK	Under front seat; 15 gallons

DORRIS MOTOR CAR COMPANY, 1211-1217 N. Vandeventer Avenue, St. Louis, Missouri.

C. H. DEERE, P. **W. E. CLARK, V. P.** **C. F. DRURY, Mgr.**

LIGHT RUNNING

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SIMPLE CONTROL

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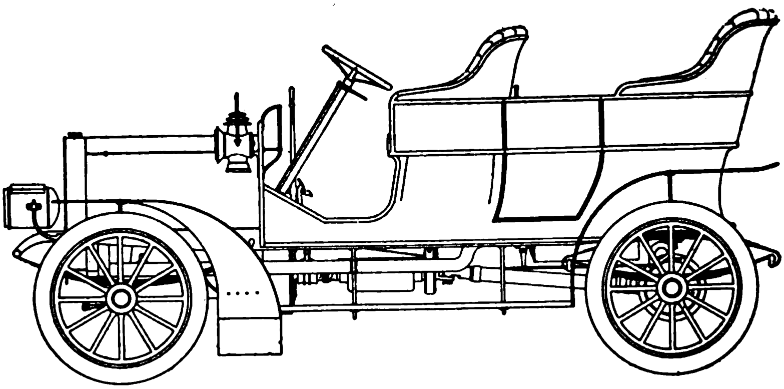

For a car of quality and style and one that is bound to please select a "DEERE."
Price, $2000.00

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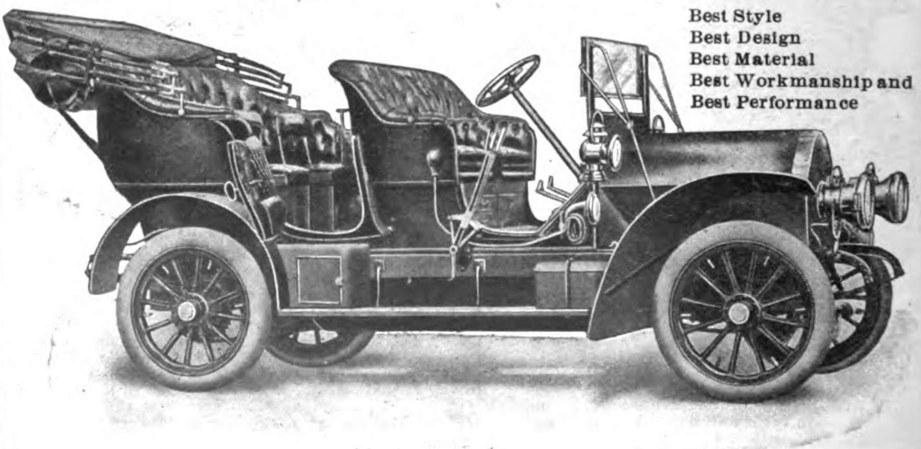
THE GREATEST COMBINE IN THE AUTOMOBILE WORLD
is found in the

Four Cylinder Waterless Knox



- Best Style
- Best Design
- Best Material
- Best Workmanship and
- Best Performance

Send for catalogue of two and four cylinder pleasure cars,
also catalogue of commercial cars.

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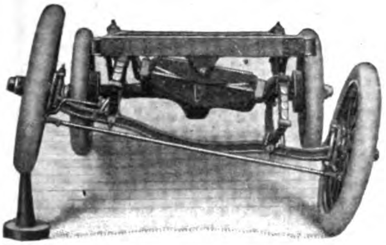
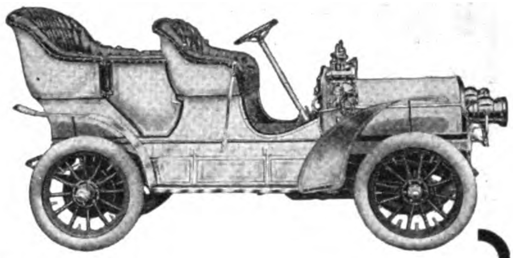
THE MARMON

"A Mechanical Masterpiece"





"It Floats"

That was the remark of an old driver whose spine has been hammered over thousands of miles in other cars, when he took his first ride in the Marmon.

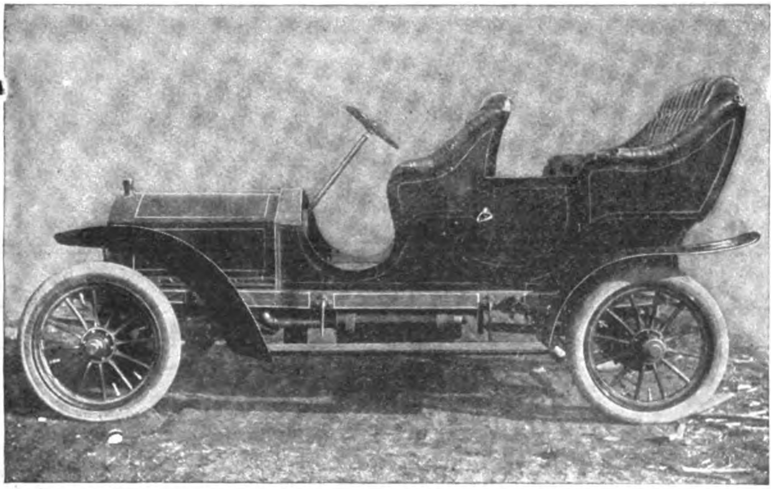
No other car has anything like its easy, gentle sway over the roughest roads. No other car has its features of flexible running gear, which practically eliminates road strain, keeps the entire mechanism always in perfect alignment and makes life easy for the tires.

Double Three-Point Suspension

Two frames, operating independently of each other. Cast aluminum body on upper frame entire power plant on lower frame, each frame suspended on three pivotal points. An absolutely successful, dependable air-cooled motor. Write for Booklet No. 5.

Four Cylinders Air-Cooled
Model C, 24 H. P., $2,500
Model D, 30 H. P., $3,000

NORDYKE & MARMON CO.
(Estab. 1851) **INDIANAPOLIS, IND.**
Members Am. Motor Car Mfgrs. Association.



MODEL H

PUNGS-FINCH

A car that has been thoroughly tried out and stands the test

Last October one of our Model F cars was driven from Detroit to New York in 48 hours, running time, *without a single adjustment or repair*, except springs. This certainly shows reliability.

MODEL F	MODEL H
4 cyl. 22 h. p. Sliding gear transmission. Bevel gear drive. Double side door. **$1,850.**	4 cyl. 28-32 h. p. Sliding gear transmission (selective type). Hess Bright Ball Bearings. Bevel Gear drive, floating type. Full lamp equipment. **$2,200.**

Guaranteed for One Year.

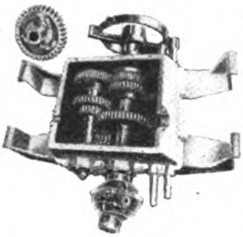
PUNGS-FINCH AUTO CO., Detroit, Mich.

N. Y. Agts. Frayer-Miller Motor Car Co., 65th and Broadway.
Chicago Agts. Greer Motor Car Co., 1421 Michigan Avenue.

HAYNES Transmission...

More damage and loss of power is occasioned through faulty transmissions than any other one feature of an Automobile.

In the ordinary types of transmission when a change is made from a high to a lower gear, the shock of the sudden checking of momentum may be, and usually is, thrown upon the entire mechanism of the car, the engine being depended upon to act as a brake. The severity of this shock to the mechanism in shifting from high gear at 30 miles per hour with a 2750 pound car and a normal load, to 15 miles per hour on middle gear, is equivalent to a vertical fall of 7 feet.



The Haynes Transmission assures ease and perfect safety in operation, and entirely prevents the violent shock that would ordinarily be caused by changing from high to a lower gear.

In the hub of the Master Gear is a ratchet and pawl device which permits the car to coast with middle or low gear engaged until the speed of the car and engine are equal, when the pawls engage and engines take up the load. Change may be made from high to middle or low gear without any possibility of burring or stripping the gears.

The Haynes is the Highest-Powered Shaft-Driven Car built. In requesting Catalogue, for prompt attention address Desk G, 2.

The Car the Repairman Seldom Sees

HAYNES AUTOMOBILE CO., Kokomo, Ind.

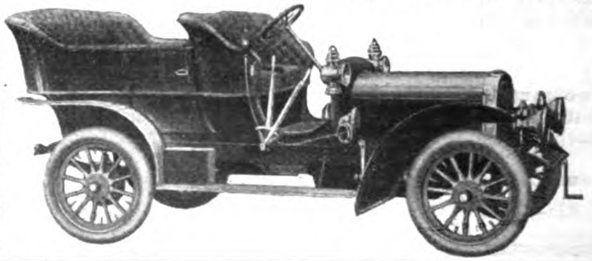
Oldest Automobile Manufacturers in America. *Members A. L. A M.*

Chicago: 1420 Michigan Ave.

New York: 1715 Broadway

Model "R" Four-Cylinder Touring Car

Vertical roller-bearing engines. Cylinders cast separately, 5⅛x6 inches, 50 H. P. An exclusive transmission that absolutely prevents stripping of gears. Positive cooling system. Individual and special lubrication. Master Clutch has metal faces and takes hold without jerking. Shaft drive. Exclusive universal joints that prevent wear on pins. Sprocket and Roller Pinion and perfect Rear Axle, all exclusive. Roller-bearings throughout. 108-inch wheel base, 54-inch tonneau, seating five people. Four to 60 miles an hour on high gear. Weight, 2,750 pounds. Price, $3,500, f. o. b. Kokomo. Full equipment.



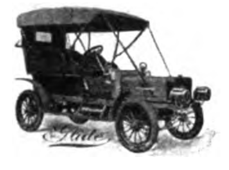
MOORE AUTOMOBILE CO.

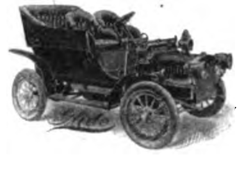
571 Fifth Ave., New York.

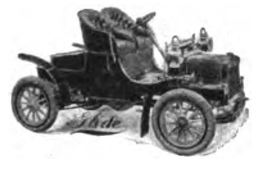
MOORE 40 H. P. CAR

"THE BALL BEARING CAR."

EVERY REVOLVING SHAFT ON BALL BEARINGS. SIMPLICITY IN CONSTRUCTION AND OPERATION.







THREE GLIDE MODELS FOR 1906

Model C Glideabout, single cylinder, 10 H. P.,	$ 800.00
Model F Glide, 18 H. P.. double opposed,	1250.00
Model E Glide, 36 H. P., four cylinder,	3000.00

All swift smooth, good-running cars that travel everywhere.
Catch the Glide idea.
To Glide, not simply ride, is the 1906 way to go.

Moving off from a standstill so smooth and easy you hardly know you are going until you reach full speed. Running smoothly and silently without jar and slowing down until you hardly know when you stop; that is gliding. It makes the Glide much talked about and saleable everywhere. It is free from freaks and has no untried notions. The basis of its success is that it goes over the road and gives satisfaction.

Our proposition means a good line, prompt shipment, right prices, liberal commission, good territory, and a great demand for Glides.

Member American Motor Car Manufacturers' Association.

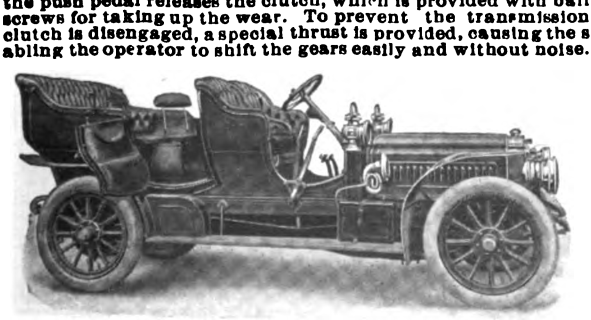
Manufactured by

THE BARTHOLOMEW CO.

PEORIA, ILL.

VINDICATOR OF AMERICAN MECHANICAL GENIUS ABROAD

Foreign manufacturers have combined to turn their strongest batteries upon the Thomas. The contest is welcomed—welcomed with a sense of absolute certainty as to the outcome. And we are frank to add that this sense of certainty is accompanied by a feeling of pride and satisfaction that American constructive ability in the automobile world is about to be triumphantly vindicated. Sure and Certain are mighty common words but they describe The Metallic Three Disc Clutch OF THE NEW THOMAS FLYER about as clearly and forcibly as it can be described. We say SURE because it never grips fiercely, but always slowly and gradually, and when it once grips the surface of the fly wheel it cannot slip, or give the least trouble. One of the most important improvements in the 1906 model. We say CERTAIN because after the most rigid and exhaustive tests of thousands of miles under adverse conditions with extra heavy loads. The Thomas Clutch has the reputation of never having slipped or shattered the car in starting. REASONS WHY are best explained in describing the clutch itself. The Thomas THREE METALLIC DISC CLUTCH, on which patents are pending, is a metal to metal, three plate device, with a center plate of manganese bronze, the two outer plates being of the finest grade of grey iron. The manganese plate being the transmitting member is fitted with a series of holes filled with the best grade of cork cushions, which not only prevent any noise. but also prevent the possibility of violent gripping, doing away with jerky starts. An easy pressure on the push pedal releases the clutch, which is provided with ball thrust bearings and adjustable screws for taking up the wear. To prevent the transmission shaft from running when the clutch is disengaged, a special thrust is provided, causing the shaft to come to a standstill enabling the operator to shift the gears easily and without noise.



In our detailed description of the dominant features of the Thomas Flyer, which are of vital importance in automobile construction, we have been compelled to be brief. However, our catalog of the 1906, 50-Horsepower Thomas Flyer contains information valuable to any motorist or prospective buyer.

REMEMBER—That every stock car is guaranteed to a speed of 60 miles per hour before shipment. That the New Thomas is constructed to wrest supremacy from the best made foreign cars regardless of price. That it is the fastest and most powerful American car made. Send for Illustrated Catalogue.

THE THOMAS MOTOR CO. 1418 Niagara St., Buffalo, N. Y.

MEMBERS ASSOCIATION LICENSED AUTOMOBILE MANUFACTURERS.

GAETH AUTOMOBILE WORKS
CLEVELAND OHIO

Three Touring Car Models

20-24 H. P.—$2000
30-34 H. P.—$2500
50-54 H. P.—$3500

Delivery Wagon Model

10-12 H. P.—$1200

- Four Cylinder Vertical Motors.
- Water Cooled Thermosyphon System.
- Sliding Gear Transmission.
- Shaft Drive.
- Force Feed Oiler.
- Roller Bearing Wheels.

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BAKERY
BELL PHONE
87 DITTON ST.

GAETH MOTORS are
Simple--Powerful--Quiet Running
WRITE FOR BOOKLET

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MARK XLVII. 40-45 H. P.

A powerful, fast, most luxurious touring car with delightful ease of riding and all carriage conveniences. Possesses the best attributes of foreign cars and a wealth of exclusive Columbia features. Seats five persons with auxiliary seats for two. With Standard Body, $4,500. With Victoria, Limousine or Landaulet Body, $5,000 to $5,500.

MARK XLVI. 24-28 H. P.

Make and break ignition, positive gear pump lubrication, three point suspension for motor and transmission set, shaft drive. An extraordinary hill climber. Most powerful brakes ever put on a car of its weight. Seats five. Price, $3,000.

MARK XLIV—2

Perpetuates with important changes in details the successful Mark XLIV Columbia of last season. The highest grade 2-cylinder car on the market. Seats five. Price, $1,750

Separate Catalogues of Columbia Gasolene Cars, Columbia Electric Carriages, and Columbia Electric Commercial Vehicles will be mailed on request; also special illustrated booklets; "Columbia Chrome-nickle Steel," "Fashioning a Crankshaft," "Consistent Differences in Columbia Cars," "Transmission, etc."

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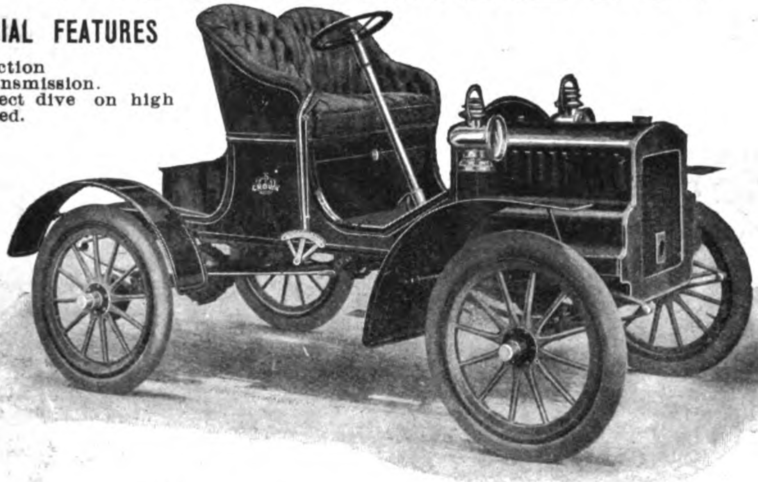
CROWN RUNABOUT

SPECIAL FEATURES

Friction Transmission.
Direct dive on high speed.



H. P. 12. PRICE $750

OTHER CARS 16 H. P., 1500 lb. carrying capacity Delivery Car.
24 H. P., 5-Passenger Touring Car.

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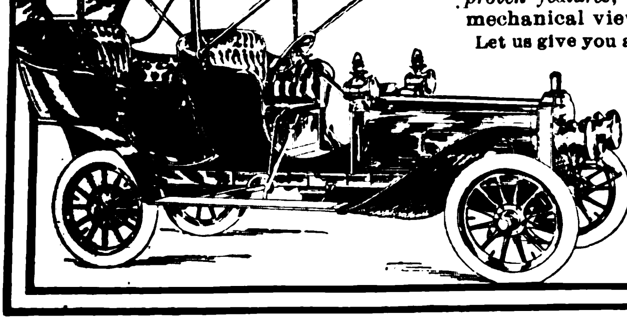
Detroit Auto Vehicle Co.
65-71 Catherine St., Detroit, Mich.

FORD SIX CYLINDER TOURING CAR

"Model K" 6 cylinders 4½x4¼ 40 H. P. Speed 50 miles. 114 Wheel Base. Magneto Ignition. Mechanical oilers. Wheels 31 in. Tires 4 in. Weight 2400. Price $2,500.

¶ **"Model K"** is a luxurious touring car with a world of *reserve power*, with speed to meet every requirement, with an engine so simple, so smooth in its operation that the presence of a motor on the car could almost be questioned. A car that is the growth of a lifetime of study and practical development in automobile construction.



There is no feature in this car that has not been *worked out*. There is no danger from experiments. They are radical features but they are *proven features*, backed up not only by the best mechanical views, but by *actual experiences*.

Let us give you a demonstration of this splendid car.

Detriot, Mich.
FORD MOTOR CO.
Members American Motor Car Manufacturers Association, Chicago.

BRANCHES; 147-149-151-153 Columbus Ave., Boston; 1721-23 Broadway, New York; 727 Main St., Buffalo: Broad and Buttonwood St., Philadelphia; 1444 Michigan Ave., Chicago: 1918 E. Euclid Ave., Cleveland and 308-310 E. 11th St., Kansas City.

CANADIAN TRADE supplied by Ford Motor Company of Canada Lt'd., Walkerville, Ontario.

Licensed Under Selden Patent
40-45 H. P.
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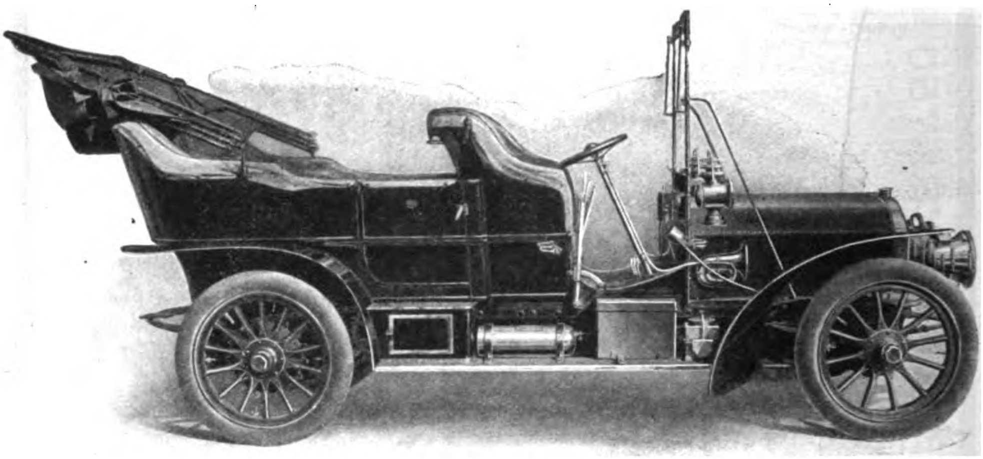
"Matheson"

Self-starting from the seat with make-and break ignition. Water-cooled brakes



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Complete Catalogue mailed on request.

The new Matheson factory is one of the largest and most modern automobile plants in the world.

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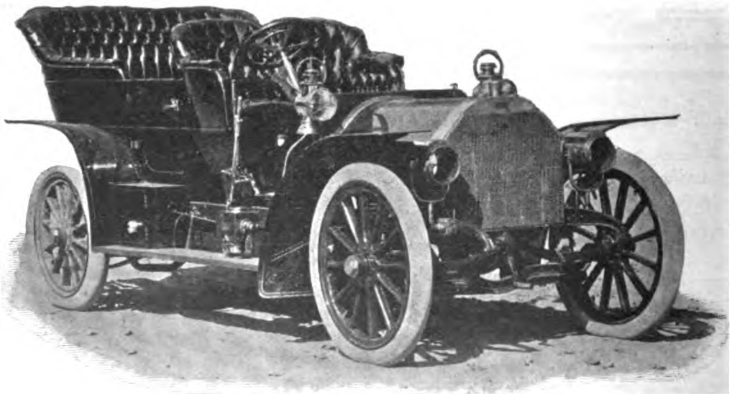

The mechanical construction of the 1906 American Mercedes is as perfect in its working as nature itself, even to the smallest detail. Our ownership of all the patents, designs and shop-drawings of our parent company, The Daimler Motoren Gesellschaft of Germany, for the United States and Canada, enables us to make an exact copy of the German Mercedes. All vital parts are imported.

Paris price of the Mercedes, $7,500 **New York price of the American Mercedes, $7,500**

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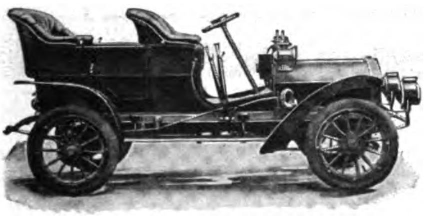
Stevens-Duryea

The Stevens-Duryea is very much the lightest weight four-cylinder car of its type made anywhere; despite this apparent paradox, we state without any hedging whatsoever, that the Stevens-Duryea, owing to its Unit Power Plant supported on three points, can be driven with perfect impunity over roads so rough as to be ruinous to cars not so built, and that, owing to its light weight, it is possible to use tires small enough to fit in most ruts without injury.



Send for "The Twentieth Century Hustler"—not a manual of glittering generalities, but a book replete with the whys and wherefores of the STEVENS-DURYEA.

Price, Standard Equipment, $2,500.

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The Autocar

TYPE XII $2600

Four vertical cylinders; 24 h. p.

Direct shaft drive. Sliding gead transmission. Three speeds an reverse.

Wheel base, 100 inches.
Weight, 2475 lbs.
An ideal combination of power plant with size and weight of car.

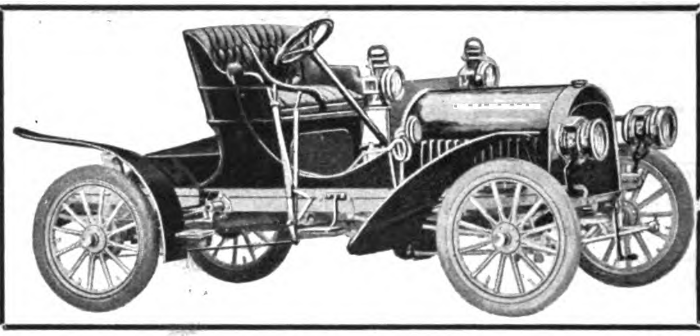
A steady-service car. ***Reliability*** its characteristic. Big and luxurious enough for the longest tours, with ample power and reserve strength. Not too cumbersome for short runs. Extraordinary in direct-drive performance and ability up grades. Distinguished for its simplicity of control—throttle and spark governed by the grips in steering wheel.

Write for Autocar Book, describing Type XII, and Type X (Runabout, $1000).

The Autocar Co., Ard

MEMBER ; Association of Licensed Automobile Mfgs.

Reliability



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Light, Fast, and Mechanically Right; convertible to four passenger surrey.

Aluminum bed of engine and transmission is absolutely Mud Proof, leaving no part of engine and transmission accessible from beneath car; our own original feature. It is

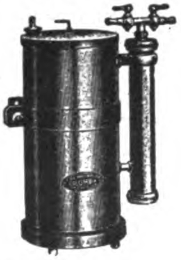
THE IDEAL GENTLEMAN'S CAR

because Only Tried and True Features of both foreign and domestic makes are incorporated, so repairs are minimized.

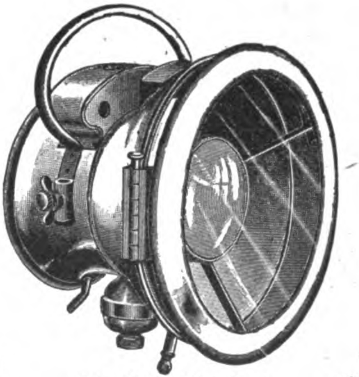
Years of both mechanical and driving skill have been centered in this "Right Car at the Right Price." **Specifications:** Four Cylinder Vertical Engine, 24 Horse Power, Water Cooled, 98 in. Wheel Base, 32 in. Wheels, Weight, 1700 lbs; Entirely Mud Proof, Price, $1650; Surrey Seat $125.00 additional. Write at once for full particulars.

Responsible Agents Wanted.

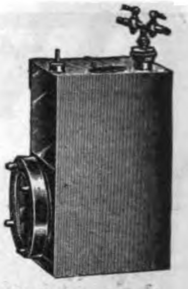
MORA MOTOR CAR CO., 317 Livingston Bldg. Rochester, N. Y., U. S. A.



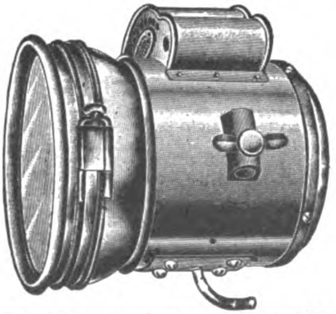
Columbia, No. 2 Generator
32 oz. Carbide.



Columbia Parabolens Lamp



Columbia, No. 2 B Generator
32 oz. Carbide.



Columbia Flare Opening Lens Mirror Lamps, 1 & 2

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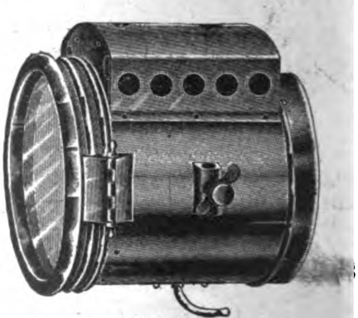

Columbia Straight Barrel Lens Mirror Lamp A-B-C-D

Hine-Watt Mfg. Co., 58-60 Wabash Ave.,
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TREBERT GAS ENGINE COMPANY,

Manufacturers of

Water
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Air Cooled
Motor
for
Autos and
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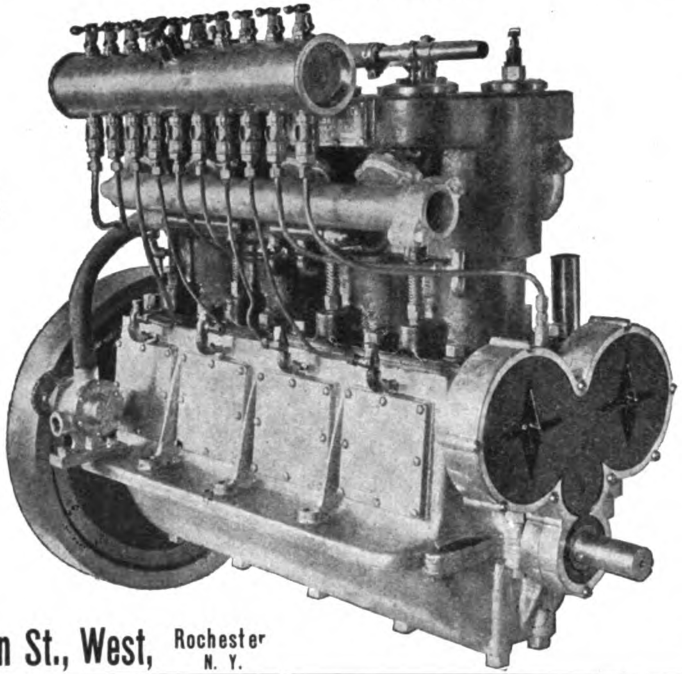

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for
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Sizes of
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5 to 70 H.P.

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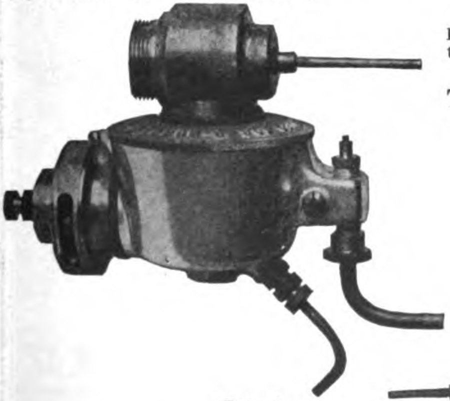
THE IMPROVED CARBURETOR

Has new features of great practical value and is therefore worth investigating.

Throttle Valve being an entirely independent structure may, if more convenient, be placed anywhere in induction pipe core.

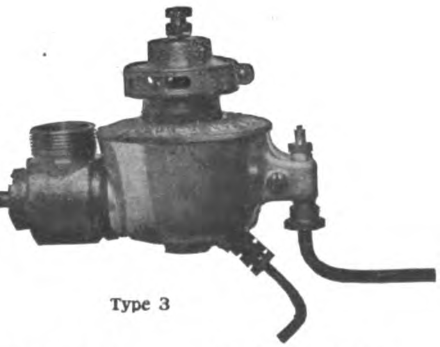
Throttle may be swung around in any of the positions shown to any radius of a circle. Can therefore, be fixed in over 1000 ways.

Throttle Valve on side Horizontally, suitable for pressure feed, where Carburetor may be placed high.



Type 2

Throttle Valve working Horizontally on top, suitable for Automobiles with gravity gasoline feed.



Type 3

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Manufactured by **B. MORGAN,**

86 John Street
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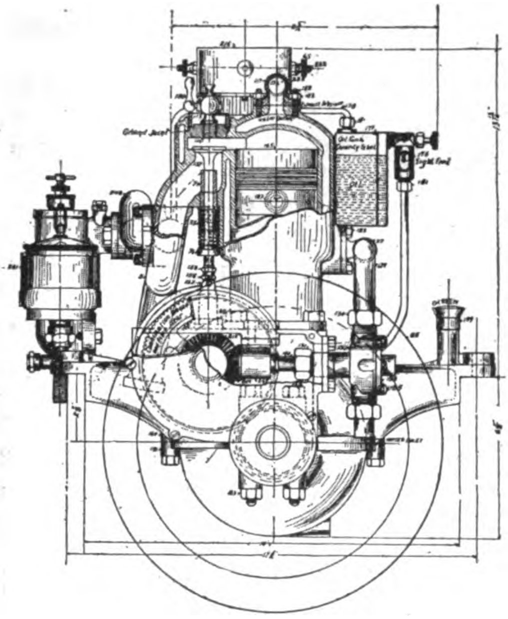
Manufacturer of MORGAN'S SINGLE PIECE VALVES. Manufacturer of MORGAN'S HOSE COUPLINGS

MR. AUTO MANUFACTURER



Are you interested in securing the best power plant for your cars? If so, we can please you, as the **Kirkham Motors for 1906 cannot be excelled.**

This cut represents our 15-20 H. P. 4-Cylinder Water-Cooled Auto Motor. Weight complete, 265 pounds. **We Guarantee** 26 H.P. under brake test. Are you interested? If so we will be pleased to hear from you with specifications.

We have other sizes including a **Six-Cylinder 25 H. P. Motor of Above Type.** Also **Three Cylinder 12-14 H.P.** Water Cooled and 14 H.P. Air-Cooled which we can deliver from stock.

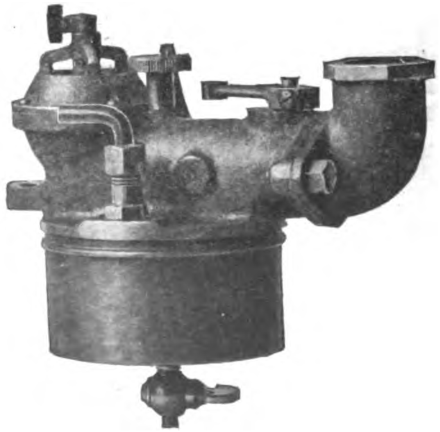
We are also prepared to manufacture on contract any size or quantity of gasoline automobile motors. Can also supply transmission gears, clutches, etc., for the above machines.

If you are in the market for any of this material better consult us before placing your order as our prices and goods will surprise you

THE KIRKHAM MOTOR MFG. CO., Bath, N. Y.

Breeze Automatic Garburetors.

1906 MODEL.



FOR ALL SIZE ENGINES FROM MOTOR CYCLE TO 200 HORSE-POWER MOTOR BOAT

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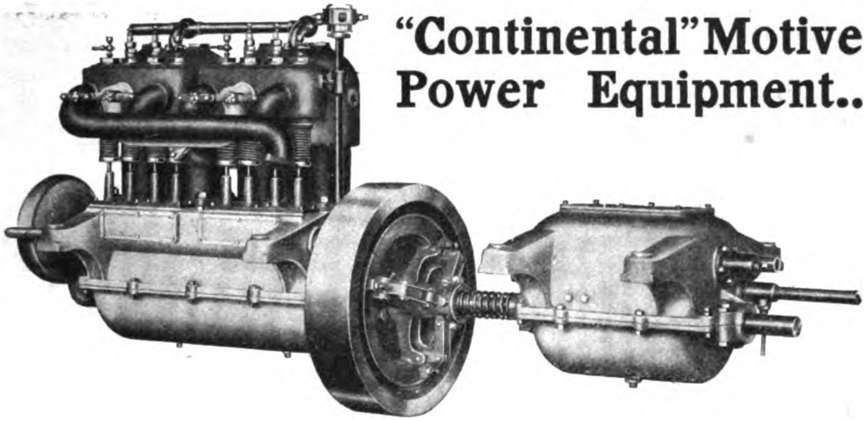

"Continental" Motive Power Equipment..

"Continental" 4-cylinder Motor, Clutch and Transmission. Made in sizes 10 to 40 Horse Power.

Early Buying Insures Prompt Deliveries

Our "Continental" Motive Power Equipment is used by many leading builders and has acquired an enviable reputation in the trade for quality, durability, efficiency, etc. Inferior imitations should be avoided. Don't be deceived. Long experience together with up-to-date equipment qualifies us to build a superior machine. Our line for 1906 will be especially attractive. Advise us of your requirements and we will be pleased to quote.

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The St. John Solid Rubber Cushioned Auto Tire

The Greatest Tire Man's Ingenuity Ever Produced

The Happy Medium

The Tire that solves the vexing problem now presented to both Manufacturers and private owners of automobiles, i. e.: Tire Troubles, Cannot Puncture, Perfect Resiliency Saves one-third the power now used with other tires. Fits Single or Clincher Rims and easily applied. Adopt our Tire, save annoyance and expense.

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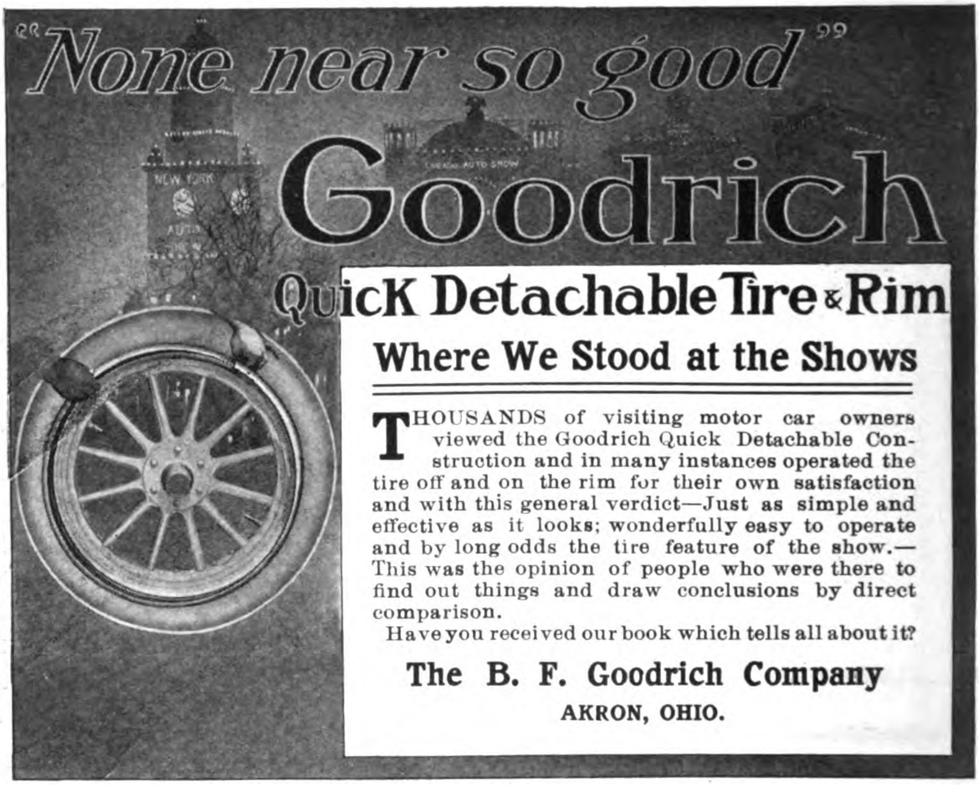

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Goodrich

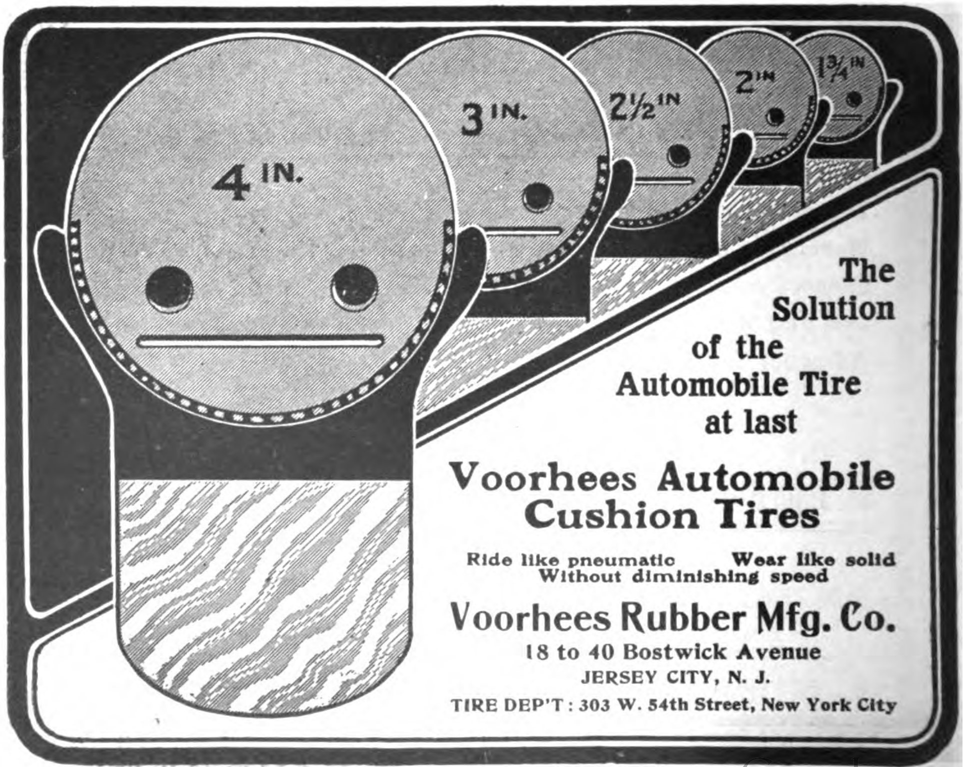
Quick Detachable Tire & Rim

Where We Stood at the Shows

THOUSANDS of visiting motor car owners viewed the Goodrich Quick Detachable Construction and in many instances operated the tire off and on the rim for their own satisfaction and with this general verdict—Just as simple and effective as it looks; wonderfully easy to operate and by long odds the tire feature of the show.—This was the opinion of people who were there to find out things and draw conclusions by direct comparison.

Have you received our book which tells all about it?

The B. F. Goodrich Company
AKRON, OHIO.



The Solution of the Automobile Tire at last

Voorhees Automobile Cushion Tires

Ride like pneumatic Wear like solid
Without diminishing speed

Voorhees Rubber Mfg. Co.
18 to 40 Bostwick Avenue
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Continental Tires

Are Furnished Without Extra Charge on the Following Well Known Cars. Watch the List Grow.

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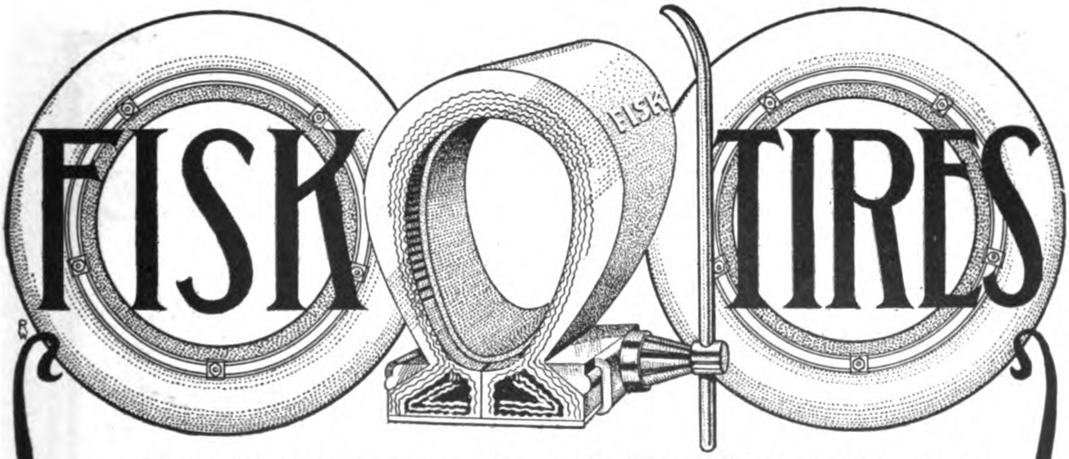
The Continental Caoutchouc Co., W. Tischbein, Pres. Emil Grossman, Gen. Mgr.

43 Warren St., New York. Factory—Hanover, Germany.



Have withstood all competition as the Safest, Most Reliable, Long Wearing Tires made.

They combine all the best features of other makes with many marked special virtues of their own.

Their absolutely safe rim attachment is undisputably a veritable accident insurance. And they have a Quality peculiar to themselves, given by combining only the best materials with particular care in each one—as if our very reputation depended upon the particular service it rendered. Write for Article on tire constructions.

THE FISK RUBBER COMPANY, Chicopee Falls, Mass.

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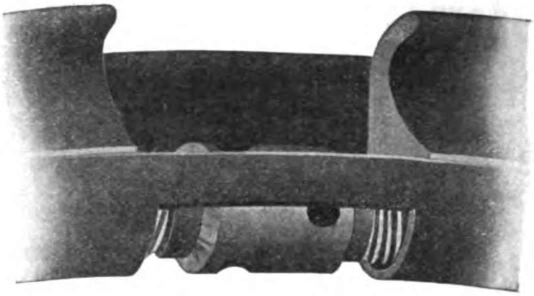
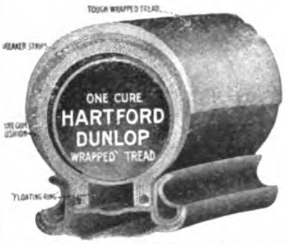


SIMPLE
SAFE

The **TURNBUCKLE** in the bead of the **HARTFORD UNIVERSAL RIM** not only takes care of the varying diameters in rim manufacture and change in size due to shrinking the rim on the wheel, but when the **BEAD**, by means of the **TURNBUCKLE**, is drawn down into place in the edge groove it is

BONDED TO THE RIM

IT CANNOT ROCK and RIM CUT TIRES of the CLINCHER TYPE BECAUSE IT IS IMMOVABLE


TOUGH WRAPPED TREAD
BREAKER STRIPS
PURE GUM CUSHION
ONE CURE
HARTFORD
DUNLOP
WRAPPED TREAD
"FLOATING RING"

Send for booklet of

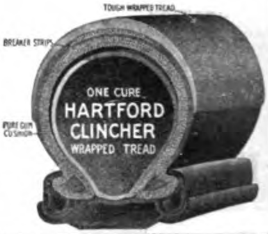
The Hartford Universal Rim

which takes

HARTFORD DUNLOP, HARTFORD CLINCHER and all Standard Tires

The Hartford Rubber Works Co.

HARTFORD, CONN.


TOUGH WRAPPED TREAD
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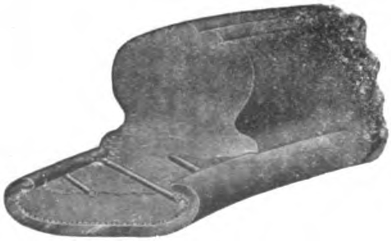
HARTFORD
CLINCHER
WRAPPED TREAD

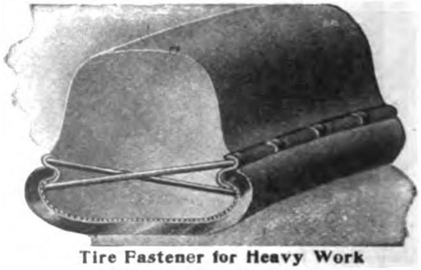
Throw Away your Pneumatics!

You will save time and money, to say nothing of trouble, if you equip your cars with the new

MOTZ CLINCHER TIRE



Tire Fastener for Ordinary Work



Tire Fastener for Heavy Work

Made of the Best Rubber Stock Procurable

In addition to its great resiliency and wearing qualities, the fastening device is a distinct improvement over all other forms of tires, since it allows double the amount of stock to retain the tire without diminishing the resiliency.

Send for printed matter and prices. MOTZ TIRES will soon pay for themselves in the saving effected in repair bills.

THE MOTZ CLINCHER TIRE & RUBBER CO.

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NEW YORK OFFICE: 1773 Broadway, H. C. Comstock, Selling Agent

Change Tires 30 Seconds Goodyear Universal Rims

SUPPOSING you were 25 miles from home, and your tire exploded. And you hadn't another with you. And when you stopped at the garage: the man said: "I'm sorry, but I haven't a single tire of that make."

Wouldn't it make you mad?

Of course it would, if you had an *ordinary* rim.

But if you had a Goodyear Universal Rim, you would smile and say: "Bring on any old tire, as long as it's a clincher, my rim will take it." And in less than three minutes you would be enjoying the scenery once more.

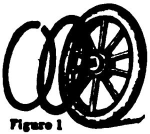


Figure 1

Because it *isn't* an all day job to take off and put on a tire when your car has Goodyear Universal Rims. Just jack up the wheel and in 30 seconds the old tire is off, and in another thirty seconds the new tire, ANY kind, is on. You need no tools but the hands. And are "fixed up" and on the road while the man with *ordinary* rims is hunting for his crowbars and levers. You see the flange comes right off on Goodyear Universal Rims like Fig. 1.

And then a 26-inch tire (for example) slides right on to the 26-inch rim like Fig 2 as easy as you would put on your hat. On an ordinary rim, you have to pry that 26-inch tire over a 27-inch flange. You know what a profanity inspiring job that is, and it doesn't do the tire any good either.

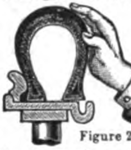


Figure 2.

Now this is all there is to taking off and putting on a tire when you have Goodyear Universal rims. See how simple and easy it is.

The rim is made up of four parts, like Fig. 3.

Nos. 1 and 3 are the removable flanges (rings) which can be adjusted to any clincher tire.

No. 2 is the base of the rim attached to the falloe of the wheel. It can be used without fitting on any standard wheel built for standard clincher rims.

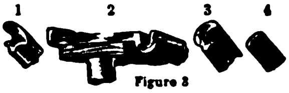


Figure 3

No. 4 is the binding ring which holds the flanges in place.

This ring can't be removed (and, of course, the tire can't come off) while the flange presses against it. This flange is kept tight against the ring by a plate which slips over the valve stem.

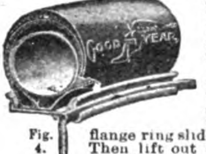


Fig. 4.

When you wish to remove the tire, loosen the nut which holds the valve stem down, and push the stem up through the rim. This pushes up the plate and lets the flange ring slide inward like Fig 5. Then lift out the binding ring, slip off the flange, and pull off the tire. Time, 15 seconds No tools but the hands.

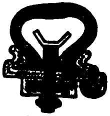


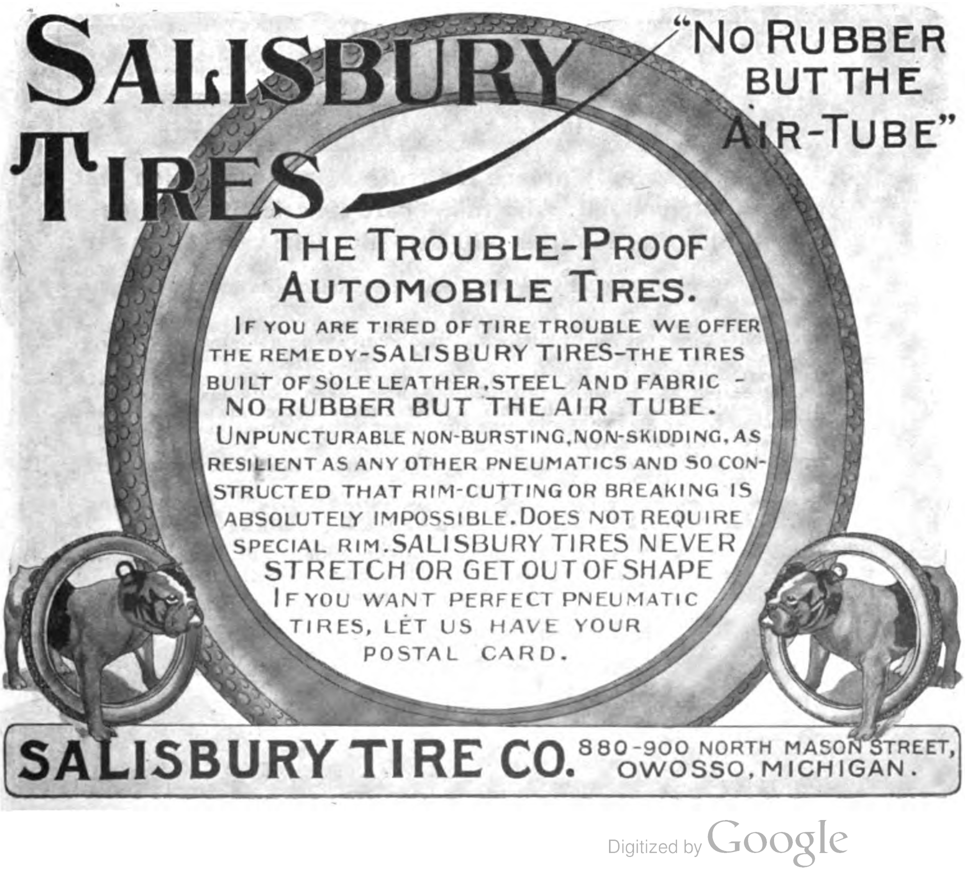
Figure 5.

Those who are weary of tire troubles are specifying Goodyear Auto Tires on Universal Rims. This equipment *costs no more* than the ordinary kind, and multiplies the pleasures of motoring many times.

Ask for our "Good News Book" and find out all the good points of the Goodyear Auto Tire and Universal Rim It's of vital interest to the Manufacturer, Dealer or User who is satisfied with nothing but *the best*.

THE GOODYEAR TIRE & RUBBER COMPANY - Warwick Street, AKRON, O.

Branches in following cities: Boston, 6 Merrimac St.; New York, 64th and Broadway; Chicago, 110 Lake St.; Cincinnati, 242 East Fifth St.; St. Louis, 1219 N. Broadway; Denver, 220 Sixteenth St.; Detroit, 242 Jefferson Ave., and Los Angeles, W. D. Newerf, 932 So. Main St.



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"NO RUBBER BUT THE AIR-TUBE"

THE TROUBLE-PROOF AUTOMOBILE TIRES.

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Made of a weight that gives the best results on all kinds of roads.

Tough Durable Speedy Comfortable

G & J Tire Co.

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MORGAN & WRIGHT TIRES

have repeatedly proven the truth of our contention that the automobilist who takes care in selecting his tires will find that his tires will help him take care of his car.

Most any motorist knows (to his sorrow) that tire accidents do not *always* confine themselves to the *tires*.

They would be far less expensive if they *did*. Many a car has been badly disfigured because of faulty tires—the repair bill for which (and please note this) *is rightly chargeable to tire cost.*

☞ In strength of fabric, in toughness of thread, in the *shape* of the tire, as well as in the method employed *throughout* in its construction—each individual Morgan & Wright tire represents a premeditated and determined effort on our part to protect *both the automobilist and his car* at all times and under all possible; road conditions, and to *reduce* his maintenance bill.

Ask any motorist who has used these tires as to whether this effort on our part is successful.

MORGAN & WRIGHT, Chicago

New York Philadelphia Cleveland Minneapolis St. Louis
Denver San Francisco Syracuse Boston Dayton
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MORGAN & WRIGHT TIRES
ARE GOOD TIRES

Pantasote

LEATHER

An Ideal Material for Automobiles and Motor Boats

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Do not be misled by statements that Pantasote is a name representing a variety of leather substitutes. There is only one genuine Pantasote Leather. Made and sold by THE PANTASOTE COMPANY.

We will be pleased to forward samples to anyone upon application.

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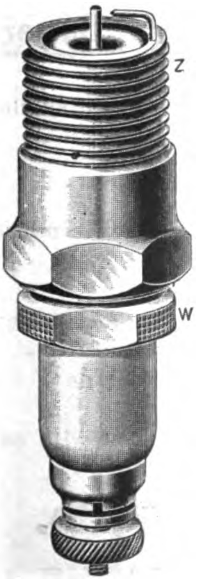
11 Broadway, NEW YORK CITY 926 Monadnock Bldg., CHICAGO

"Soot-Proof" Plug



The most economical plug on the market because it lasts so long. The Spark Always Jumps. No amount of carbon can make it short circuit. The porcelain is large, strong and non-absorbent, and cannot break under a temperature of 2500 degrees. No knowledge needed for repairs. All parts interchangeable. Beware of infringed imitations. Write for free treatise telling how to correct and avoid electrical equipment troubles of gasoline motor cars.

Specify them when ordering cars. It will save you trouble. Imitations? Sure, but that's flattery.

Indestructible, $2.00, Regular, $1.50. Guaranteed

YOUR JOBBER HAS THEM

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National Sales Corporation—Factory Sales Managers, 256 Broadway, N. Y.

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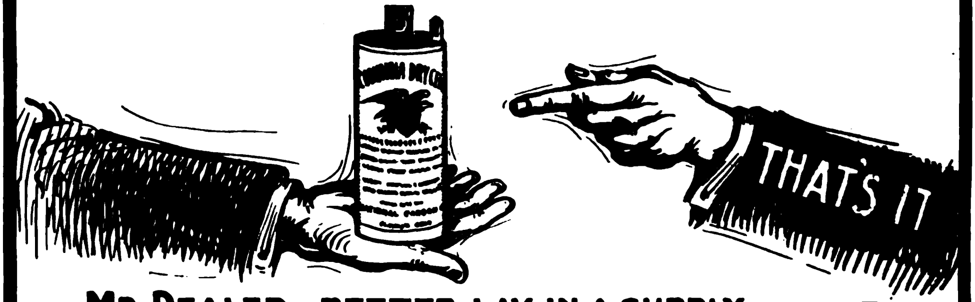

MR. DEALER = BETTER LAY IN A SUPPLY ——
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Good for years of service

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GUARANTEED exactly as represented

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6-volt-60 ampere hours

No slopping or spilling of acid

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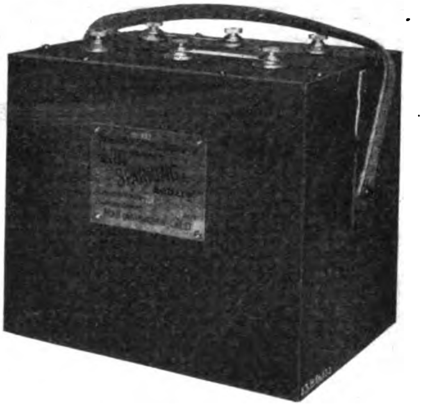
The "Exide" Sparking Battery



THE PRACTICAL IGNITION COIL FOR GASOLENE AUTOMOBILES AND MOTOR BOATS

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THE ELECTRIC STORAGE BATTERY CO.

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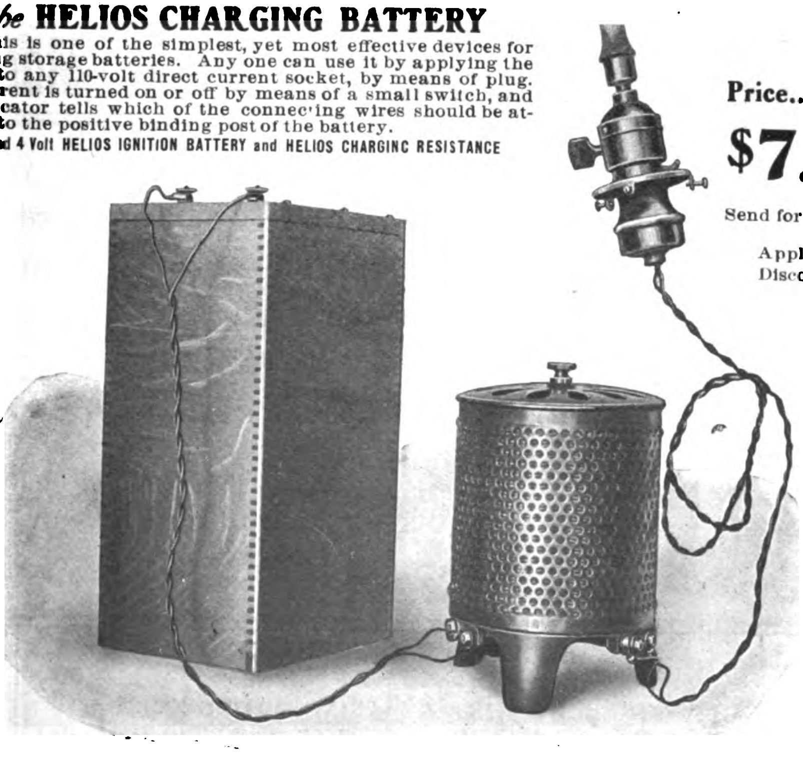
7 and 4 Volt HELIOS IGNITION BATTERY and HELIOS CHARGING RESISTANCE



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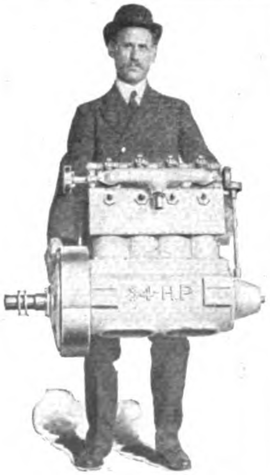

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Successors to
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The ONLY PLUG that's absolutely self-cleaning and that will stand the racket for from one to two years.

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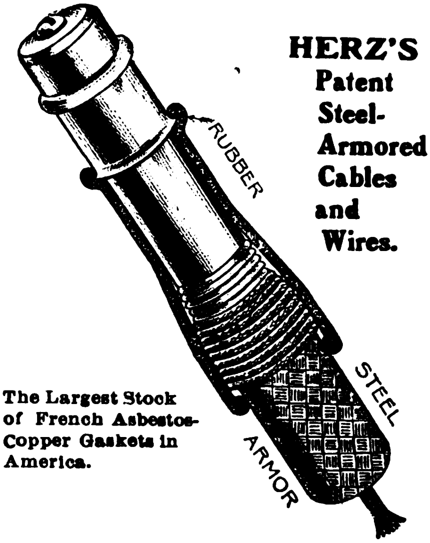

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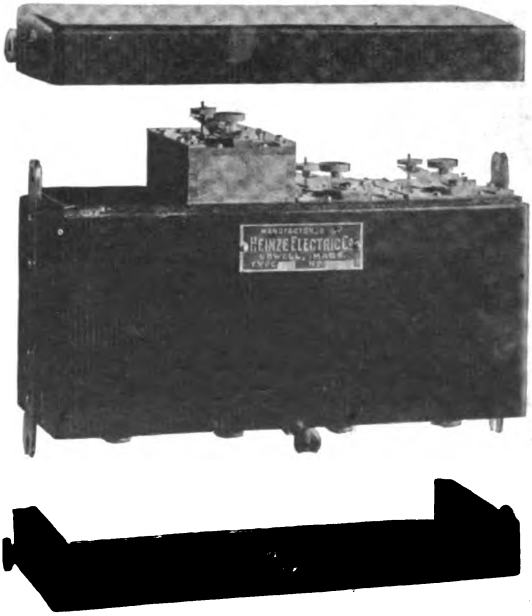

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HEINZE ELECTRIC COMPANY, Lowell, Mass.

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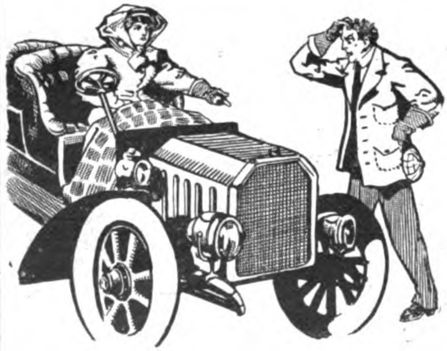

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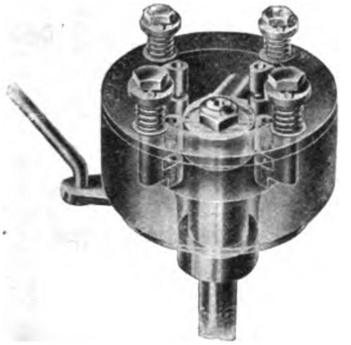

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THE "PERFECT" TIMER

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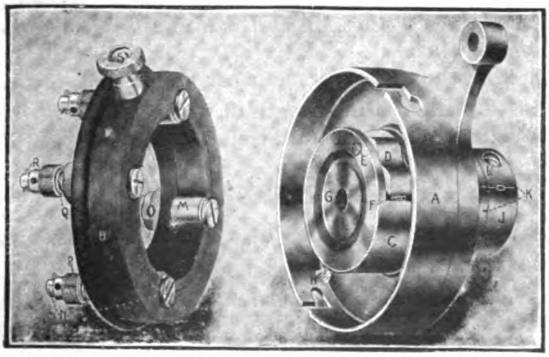

No delicate parts to get out of order. Another desirable feature is its accessibility. The cover "B" can be easily removed by raising thumb screw "S" without detaching any of the wires. Bushings "M" are stationary and pawl "D" operating on a straight coil spring, makes a positive contact and wipes away any dirt or grease on the bushings. These bushings can also be revolved by loosening the jam nut on the cover which will give four new points of contact.

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TIMERS made for one, two, three or four cylinder engines.

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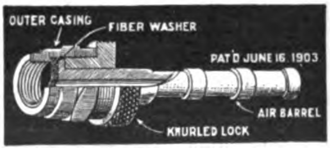
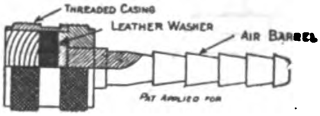


Guaranteed to make a "PERFECT" connection on all tire valves regardless of the air pressure. NOTE the long stem, fibre washer and the fact that it screws over the outside of the valves.



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Has practically the same features as the "PERFECT Air Coupling, but is made up in a less expensive manner and sells for less money. Satisfaction guaranteed.

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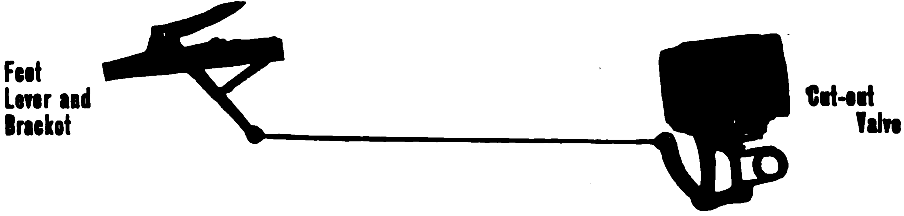
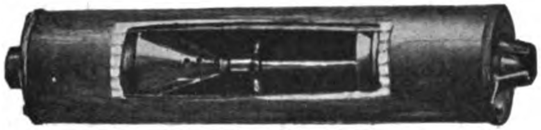
80 Sizes and Styles.

We guarantee it to muffle any engine with less back pressure than any other muffler made





1906 Automobile Type

1906 Marine Type

The *Ejector Muffler* has been adopted by a large number of the leading automobile, boat and engine builders, there being over 10,000 in use. Write for particulars and prices.

Patents allowed in United States and Canada. Patents pending in Great Britain, France and Germany.

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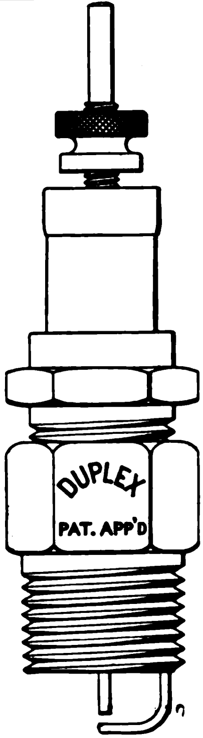

A Spark Whenever You Want It

The Duplex Spark Plug **never** fails to spark. When it becomes foul, as **every** plug does, it is instantly restored to life by pulling a switch.

You do not have to get under your car to accomplish this.

The switch is within arm's length of your seat, and you can continue your journey without even stopping your motor.

The Duplex Spark Plug

not only does away with annoying delay, but with the disagreeable task of cranking.

An additional valuable feature of the Duplex Spark Plug is that it indicates which of your plugs has become foul and reminds you to clean it at your next stop.

Mechanically, the Duplex Spark Plug is perfect. It is made in all sizes and threads.

Price, $3.00 Each

Duplex Ignition Co.

125 W. 32d St., **150 Nassau St.**

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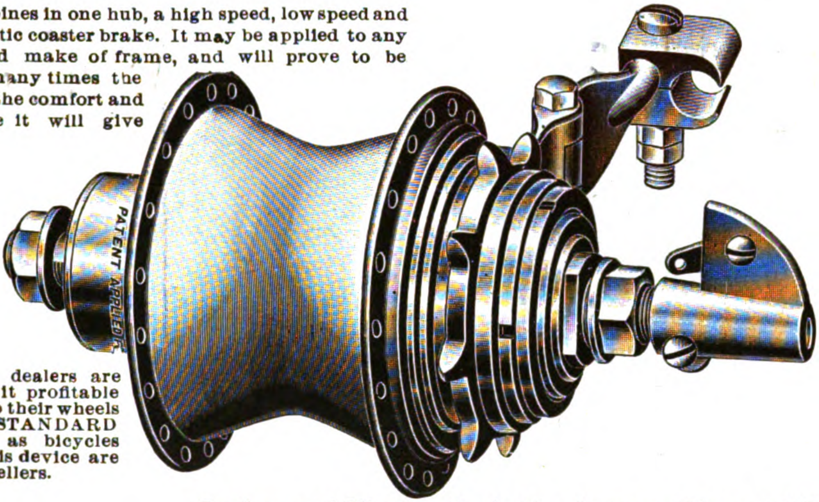
Standard **Two Speed and Automatic Coaster** **Brake Hub**

It combines in one hub, a high speed, low speed and automatic coaster brake. It may be applied to any standard make of frame, and will prove to be worth many times the cost in the comfort and pleasure it will give you.



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We also Manufacture

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THE STANDARD CO. Torrington, Conn.

In the automobilist's dictionary, "Perfection" and

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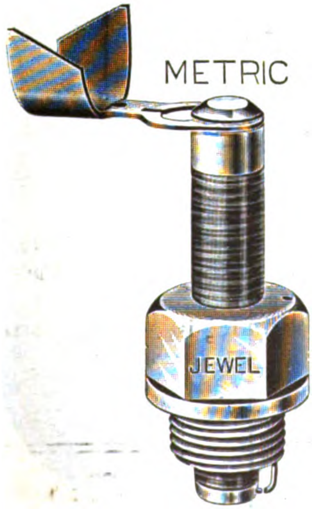

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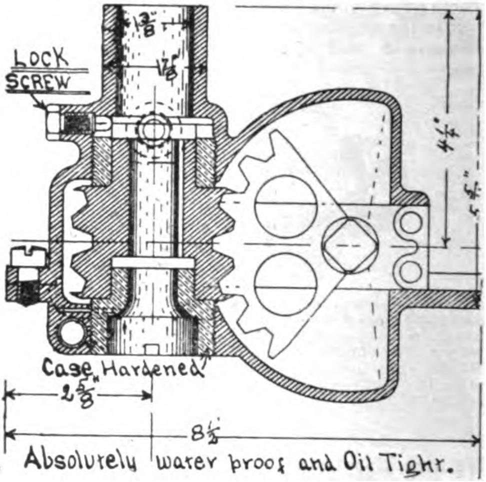
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5 5/8"
Case Hardened
2 5/8
8 1/2
Absolutely water proof and Oil Tight.

1906 Steer Gear.

THE WARNER STEERING GEAR FOR SAFETY. 3 TEETH IN PERFECT MESH AT ALL TIMES. HARDENED AND GROUND THROUGHOUT

Mfg by WARNER GEAR CO., Muncie, Ind., U. S. A.

WE ARE THE OLDEST established Automobile Lamp Makers in America and one of the largest.

Our output has been taken by exclusive sales agents and marketed under their own names.

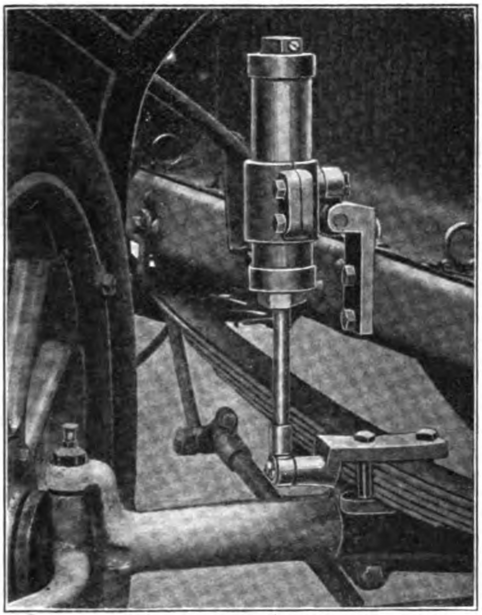
Now we offer our "**Saxon**" line to the general trade—as the best lamps our extensive experience enables us to design—as made of good materials and to be sold at the right prices.

Catalog Sent on Application

MANHATTAN
LAMP WORKS
526-32 W. 28 Street,
NEW YORK CITY.

PERFECTION AIR CUSHIONS

For Automobile Springs



AIR the most elastic substance known to science.

This double acting cushion is the most resilient shock absorber ever made—absorbing and dissipating every shock received while riding over rough or uneven surfaces.

NO VIOLENT RECOIL of springs after obstruction is passed; every movement of the body of the automobile is eased on a perfect cushion of air.

By reducing the vibration, it prevents lost traction, thus increasing your speed, and relieving the strain on all parts of the automobile. It permits of the use of lighter and more flexible springs—a point worthy of consideration.

THE PERFECTION AIR CUSHIONS require no re-adjusting—it is of few parts, can be easily applied to ANY make of car.

FULLY GUARANTEED.

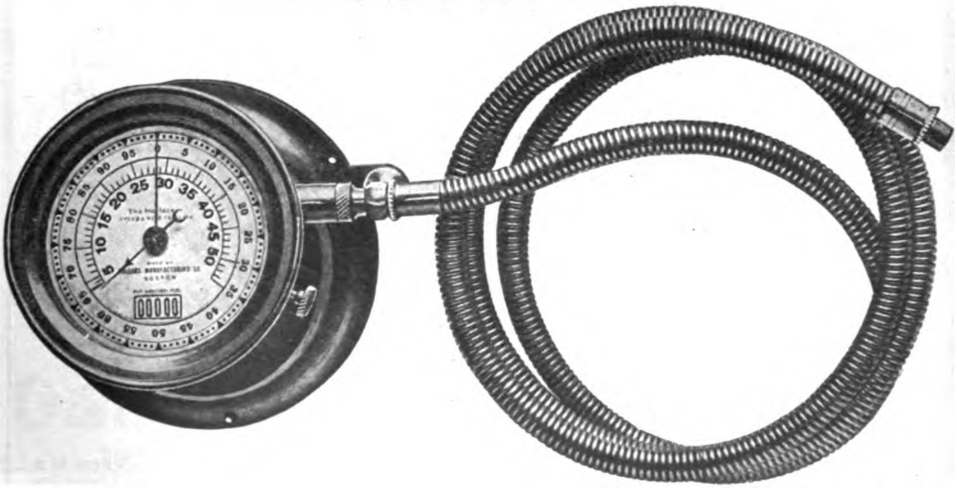
Specify the PERFECTION AIR CUSHIONS for your **1906 Model.**

For prices write:

The Sheddan Manufacturing Company, 140 W. Fayette Street, Baltimore, Md.

"THE HOFFECKER" SPEED AND MILE REGISTER

There are none "JUST AS GOOD."

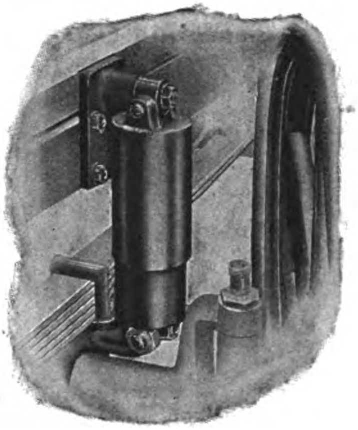


They are constructed upon correct mechanical principles, of the best materials, by skilled workmen, and are guaranteed to work perfectly and to develop the actual speed and distance traveled. The case is made of brass, and is highly polished and fixed to the dash permanently by means of screws. All the arbors and pinions have ball bearings.

SEND FOR BOOKLET AND PRICE LIST

HOFFECKER SPEED & MILE REGISTER CO.

PARK SQUARE MOTOR MART - - BOSTON, MASS.



RIDE ON AIR

Automatic-Elastic-Self-Adjusting
Mechanically Correct in Principle and Design
A Necessity, a Luxury, an Investment

Kilgore Auto Air Cushion

"Shock Eliminator" (Pat. allowed)
Is all this and Furthermore
Solves Conclusively
The question of all Vibration Troubles.

SOLD ON ITS MERITS

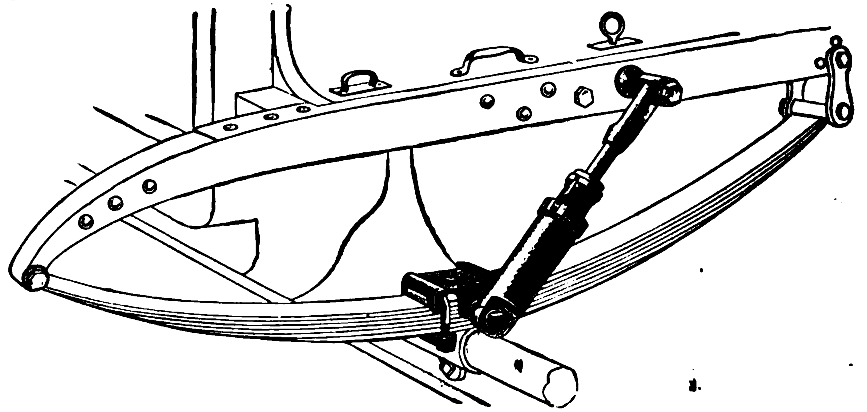
For Sale by the Following, and the Auto Trade Generally

New York, E. J. Edmond, 77 W. 44th St.
Boston, V. J. Jacobs, 46 Columbus Ave.
Phila., Pa., Paul P. Rippien, 237 No. Broad St.
Pittsburg, Pa., Jos. Woodwell Co.
Buffalo, N. Y., Mark W. Heath, Gen. Agt., 430 Mooney-Brisbane Bldg.
Buffalo, N. Y., Kelsey & Co.
Buffalo, N. Y., E. R. Thomas Motor Co.
Detroit, Mich., Auto Accessories Co.
Chicago, Ill., Wm. R. Johnston, 1303 Michigan Ave.
Tacoma, Washington, Washington Auto. Co.
Toledo, O., Pope Motor Car Co.

Sole Manufacturers
KILGORE AUTO AIR CUSHION CO., - - 48 Columbus Ave., Boston, Mass.

IT IS VERY SHOCKING

to go automobiling without the **American Hydraulic Shock Absorber.**



By relieving your car of the jar, you add to its life and the occupants' comfort. There is a difference between the **American Hydraulic Shock Absorber** and other types, and because of this fact, and the knowledge of the superiority of our device, we grant a thirty days' trial, with the understanding that money will be refunded if results are not entirely satisfactory.

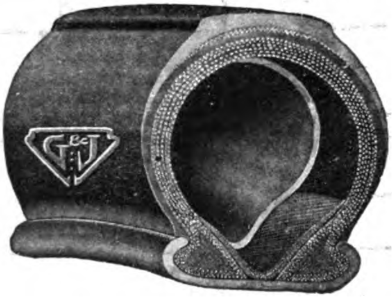
The price, including all necessary attachments for any make or weight of car, is $60.00 for a set of four. When once adjusted, it remains so for all time. **Simple, neat, strong and reliable,** and has no complicated parts.

One of the noticeable features of this device, is that the greater the shock, the greater the resistance, and where there is no shock, there is no resistance. Therefore, the springs get full play under light loads, but are protected when subjected to a severe strain.

Send for printed matter and further particulars.

Manufactured by **The American Shock Absorber Company, Easton, Penna.**

Made under the patents J. E. Smith.



A STEP FORWARD IN THE TIRE MAKING ART

G&J TIRES

FOR 1906

Combine the latest and most approved methods of tire construction with the best materials ever used by any tire manufacturer.

One Cure Wrapped Tires, Vulcanized in Open Steam. Strong, Tough, Durable, Easy to Handle.

Write Us for Catalog

G&J TIRE CO.

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Philadelphia

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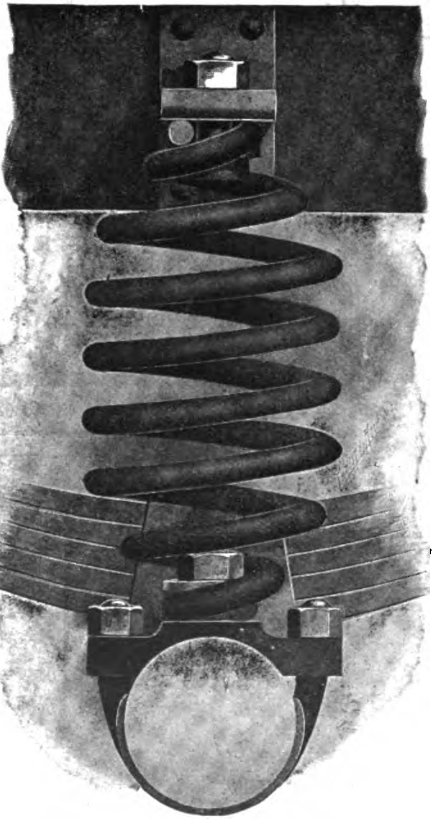
Minneapolis Plant Brothers
Portland Keats & Company.
Los Angeles-Ramsay-Hutchins Rubber Co.

Sager Equalizing

SPRINGS

For Any Car

Makes riding a luxury and saves Springs, Machinery and tires, etc.



PATENT APPLIED FOR

If comfort and pleasure are considerations don't look further.

PRICE $25.00

For set of four springs with attachments

J. H. SAGER CO.,

Rochester, New York.

N
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Automobile and Bicycle Supplies

Full line of standard Sundries carried in stock. Reasonable prices; prompt shipments

Buy here and you buy right
Our STOCK is saleable STOCK

CATALOG ON REQUEST

GEORGE W. NOCK

126 N. 4th St. PHILADELPHIA

Ham Lamps are the Best Ever Produced

THE TOURIST

Because they are built on our celebrated Cold Blast principle which insures a clear, steady, white light, therefore are far superior to any other make of lamp on the market. These lamps will not jar out on the roughest road, or blow out in the strongest wind. Try a set and be convinced. We want you to talk HAM'S LAMPS. Satisfaction guaranteed.

Write for booklet showing complete line. Address Dept. D.

C. T. HAM MFG. CO.

Rochester, N. Y.

THE VIGILANT
TAIL AND INSPECTOR

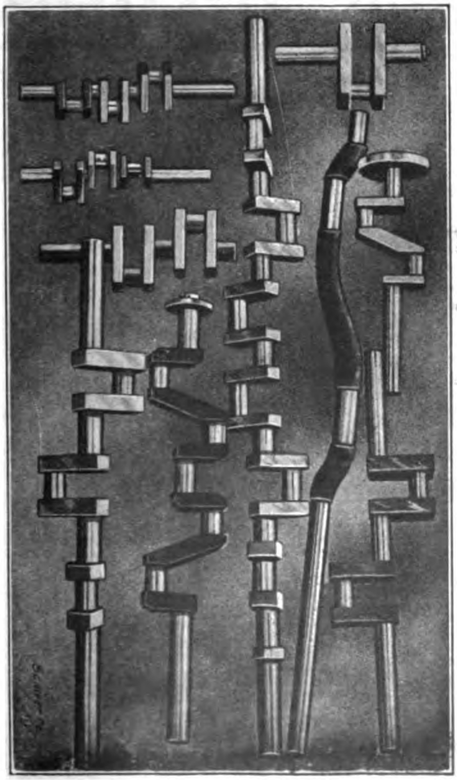
VALVE STEMS

NICKEL AND CARBON STEELS

We have dies for a great many varieties and sizes and can fill orders for almost any kind from stock
DIES

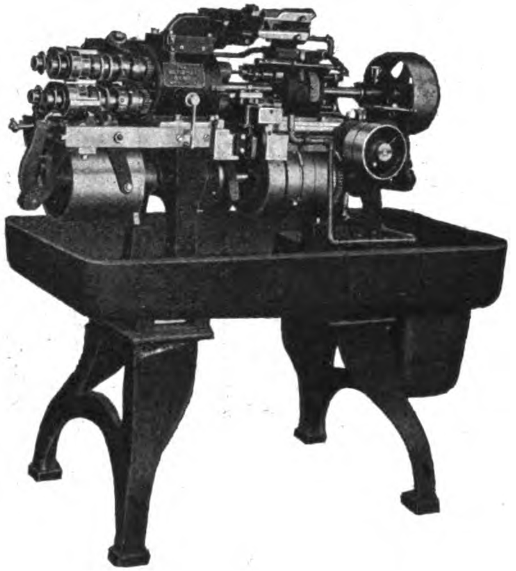
DROP-FORGINGS

CRESCENT FORGINGS CO.
OAKMONT, PA.
H. H. MINER, WESTERN REP., 11-13 SO. JEFFERSON ST., CHICAGO



GILL FORGED CRANK SHAFTS

The P. H. Gill & Sons Forge and Machine Works, Loraine and Otsego Sts., Brooklyn, N. Y., are manufacturing crank shafts, connecting rods, axles and steering knuckles for the automobile and marine trade. They have specially adapted machines for finishing their crank shafts and guarantee them true round. They make crank shafts and connecting rods in all sizes up to 6 ins. in diameter, anvil forged, and use the best acid open-hearth steel or nickel steel in all their crank shafts. They make axles grooved, octagon, or square and steering knuckles in all shapes.



"Acme" Automatic

Multiple Spindle Screw Machine

Built in Six Sizes:
¼″, ¾″, 1″, 1⅜″, 1⅝″ and 2¼″.
Operates on Four Rods.
Simultaneously.
Uses but one set of Tools.
Completes a Finished Piece in time Required for the Longest Single Operation.

Write for Details.

Our Product Department
makes a Specialty of Duplicate Parts in Quantities.
Forward Samples for Estimates.

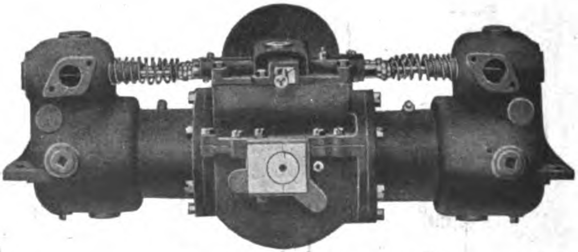
THE NATIONAL-ACME MANUFACTURING CO.
CLEVELAND, OHIO
Branch Offices—New York, Boston, Chicago.
General Foreign Representatives: Schuchardt & Schutte, Alfred H. Schutte.

The PERFECT POWER

BEAVER MOTORS—3 TYPES

12 H. P. OPPOSED
18 " "
24 " VERTICAL

All bearings and parts subject to strain are of ample dimensions.



Type T—18 H. P.

Our oiling system insures perfect lubrication.

These Motors are Furnished with Supporting Lugs Either on Ends or Sides of Cylinders.

When Ordering Specify Kind Wanted.

Deliveries to Suit Purchaser

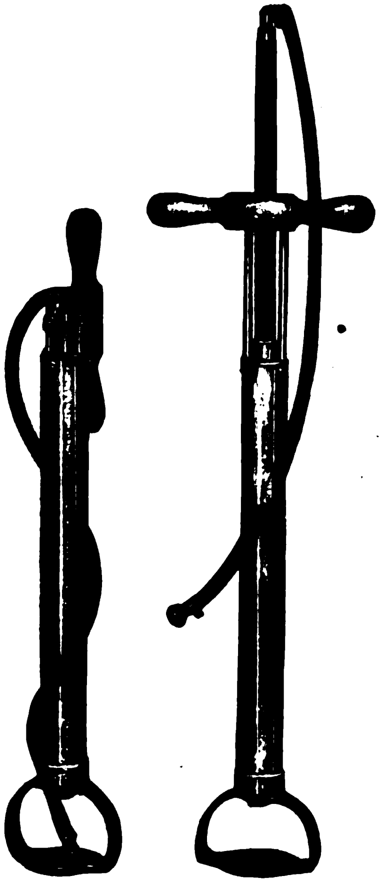
BEAVER MFG. CO., Milwaukee

Products of the

Wray Pump & Register Co.

of

Rochester, N. Y.



The Wray Compound Pump

Appeal to the masses at both the New York and Chicago shows. The public demand them.

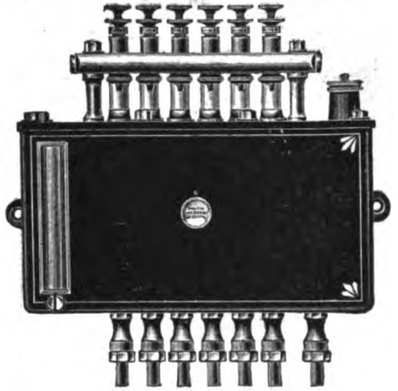
All Jobbers and Dealers handle them.

Catalog on application.

PEDERSEN LUBRICATORS

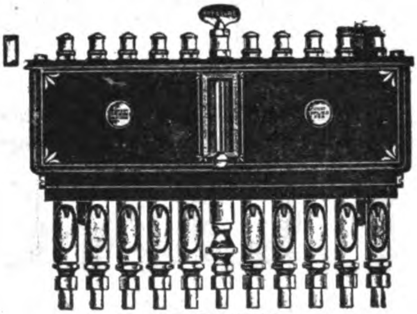
Style A

Made either Pressure or Force Feed.



Style D

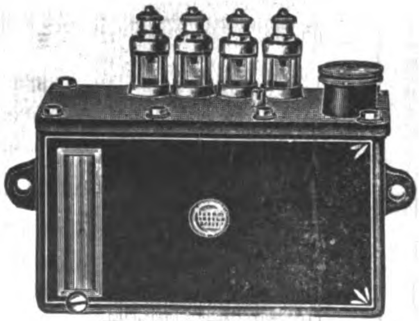
Combined Pressure and Gravity Feed.



PATENT APPLIED FOR.

Style B

Force Feed Lubricator.



Patent Pending

This Oiler has no valves or spring actuated pistons. Is positive in its workings.

Manufacturer

Pedersen Manufacturing Co

636-644 FIRST AVE., N. Y.

THE RAYMOND BRAKE

BETTER STAY HOME

than ride with poor brakes on your automobile.

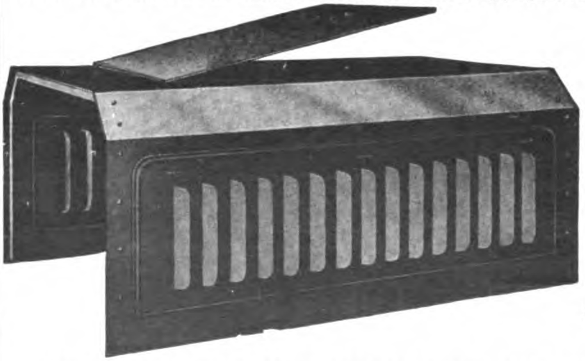
The RAYMOND BRAKE holds till the wheels slide.

ROYAL EQUIPMENT CO.

151 Housatonic Avenue. BRIDGEPORT, CONN.

LONG RADIATORS AND HOODS

We recommend the Vertical Spiral Tubed Radiators which are becoming so popular among the higher class of Automobile Manufacturers. We make these Vertical Spiral Tubed Radiators out of all sizes of Tubing from ¼ inch to ¾ inch. It is now an admitted fact that Tubular Radiators are the best all around Radiators for efficiency, lightness, strength and durability.



We also build a full line of Hoods in any design or shape our customers may desire.

Our new Catalogue, illustrating many new styles and types and containing much valuable information, is now in press. Don't fail to get a copy before deciding on your 1906 equipment

LONG MANUFACTURING CO., CHICAGO

LONG-TURNEY MFG. CO., ROME, N. Y.

Let us be your Welding Department

Electric Welding

is of great assistance to manufacturers using iron or steel in the construction of motor car parts.

Special shaped parts that are beyond the capacity of your forge and skill of your mechanics, may be produced by our process.

Motor car work in general can be accomplished with less expense and give better results, by this art.

THE STANDARD WELDING CO
CLEVELAND
McCLERNAN & ORR-WESTERN REP'S-CHICAGO

THE FOLLOWING LIST OF MOTOR CAR MANUFACTURERS USING

"Whitney" Roller Chains and Standards

IS A STRONG TESTIMONIAL FOR QUALITY AND EFFICIENCY

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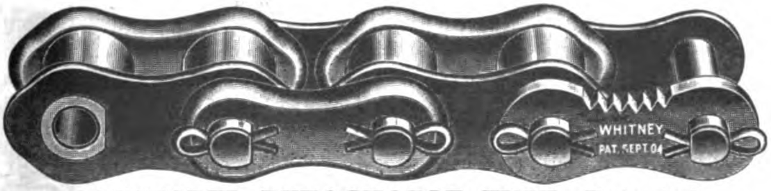


1906 MODEL DETACHABLE TYPE—Patented

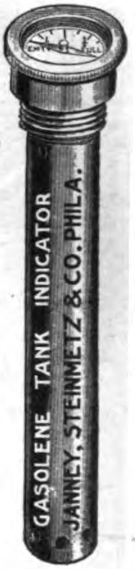
THE WHITNEY MFG. CO. HARTFORD, CONN.

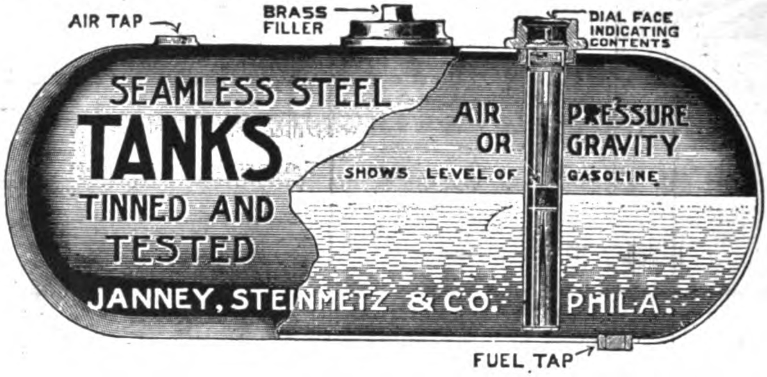
GASOLENE TANK INDICATOR

No Gauge Glass to Break or Clog, but a watch face dial that shows with a pointer the exact contents.

Tanks All Sizes Can be Supplied

Eliminates the Cause of Dangerous Carelessness in Opening the Filler Cap to try to Measure the Fuel, Especially at Night. **Indicator Price, $5.00.**


GASOLENE TANK INDICATOR
JANNEY, STEINMETZ & CO. PHILA.


AIR TAP
BRASS FILLER
DIAL FACE INDICATING CONTENTS
SEAMLESS STEEL
TANKS
TINNED AND TESTED
AIR OR PRESSURE GRAVITY
SHOWS LEVEL OF GASOLINE
JANNEY, STEINMETZ & CO. PHILA.
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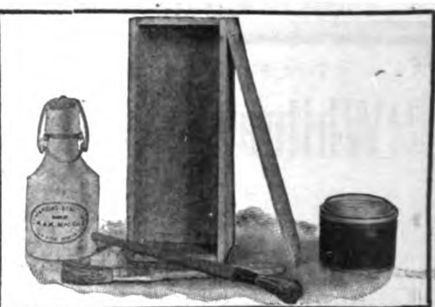
We sell **"HITCHING POSTS"** for Automobiles and **"MOORING POSTS"** for motor boats.

WRITE FOR NEW CATALOGUE. AGENTS WANTED



M & M

Cement and Acid Cure Solution, has stood the most exacting tests for years, and we can positively state that it is the only Cement and Acid Cure Solution on the markets to-day that will stand the most severe requirements for repairing inner tubes, curb cuts, and attaching treads to the outer shoe.

We want you to know more about the M. & M. Cement and Acid Cure Solution. Please send for a demonstration and a booklet describing this wonderful preparation and the name of your nearest dealer. **Packed in ¼, ½, 1pt. & 1qt. Outfits.**

—SOLD BY ALL AUTO DEALERS—

THE M. & M. MANFG. CO. Akron, Ohio.

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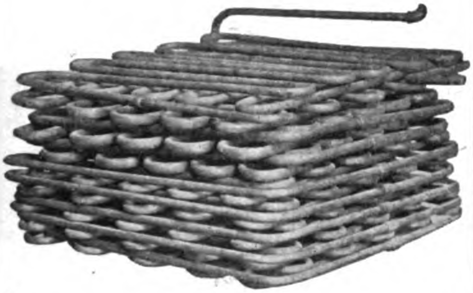

Flash Boilers
Condensers
Burners, Poppet Valve Engines,
Fittings, etc.
Write for catalog C. of up-to-date
Steam Car Specialties.

EVERYTHING FOR GASOLINE CARS

Accessories of every description.
Gasoline Engines, all types.
Transmissions.
Horns, Lamps, Tires, etc., etc.
Write for our big catalog of General Auto Supplies.
We save you money.

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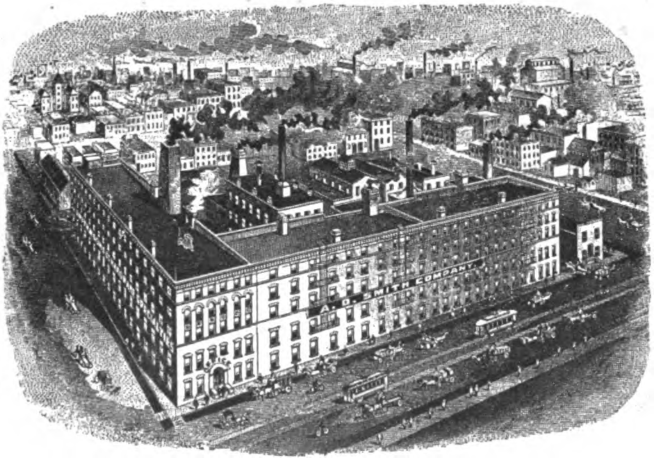

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A. O SMITH CO.
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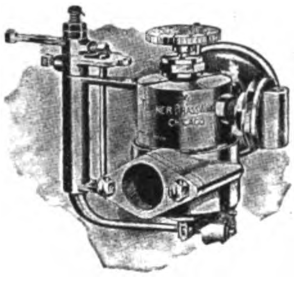
Aluminum Castings

of all kinds for use on Automobiles, Motorcycles, etc., quality, strength and lightness guaranteed second to none on the market. We supply many manufacturers, let us supply you also. Nothing too intricate to warrant satisfaction.

We make anything in **Brass, Aluminum,** and other metals, including **Patterns, Castings, Machining, Stamping, Spinning, Plating** and **Polishing.**



The TURNER CARBURETTOR

Send for our circular of **Turner Carburettor, Brass Auto Hub Bands, Ratchet Foot Treadles, Automobile Name and Step Plates, Turner Compound Auto Pumps** and **Turner Double Acting Pressure Pumps.**

Write us for prices on your requirements.

The Turner Brass Works

65 Michigan Street, Chicago, Ill.

Two Post & Lester "Exclusives"

IMPERIAL MOTOR CLOCK
8 DAY

The Imperial Motor Clock.
(8 Day) $7.00.

VOLIER: PARIS
DRAGON
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The Volier Dragon.
All the "Dragons" are imitations of the Volier.
Why not get the genuine?

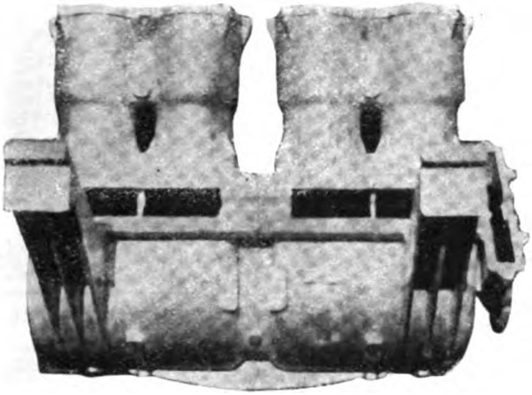
Send in Your Name for the Big 1906 Catalog.

The Post & Lester Co., Hartford, Conn.

ENOUGH SAID——AUTOMOBILE BRAND

ALUMINUM CASTINGS

Automobile Brand AJAX MANGANESE BRONZE. **We guarantee strength**



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Ajax Plastic Bronze :: ::

is the Coolest running and best wear-resisting bearing metal on the market

LIGHT MFG. & FOUNDRY CO.,

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The Biddle & Smart Company

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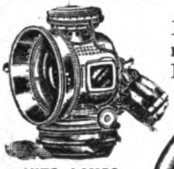
Limousine
Landaulettes

Side Entrance
and
Runabout Bodies

Delivery Wagons
and Trucks

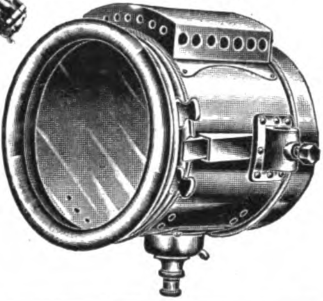
Also
Artillery
Wheels

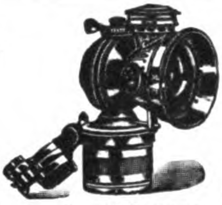
1906 **20th Century** **OIL and GAS LAMPS**



AUTO LAMPS
First
Quality
Leading
Styles.
Variety
of
Shapes
and
Reflectors

Bi and Motor Cycle, Automobile Driving-Boat, Gas Hand Lanterns, etc.





Oval and Square
GENERATORS
that generate
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Original
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New
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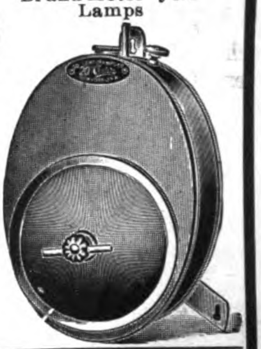

House and Town Acetylene **GENERATORS**. A first-class, safe, simple and cheap system of Illumination.

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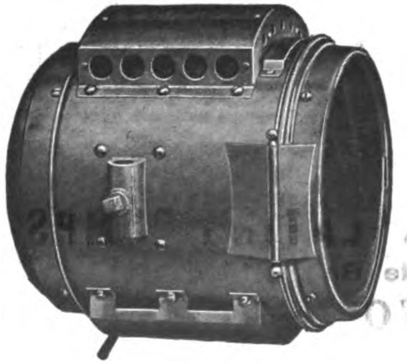
SPECIAL OFFER!

TO AUTOMOBILISTS



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WE wish to deal direct with the owner, are ready to give you the factory price, can ship the goods within 5 days after order is received.

DO you want the BEST LIGHT or you want a FREAK style?

Peck Gas Lamps and Generators have stood the severest test possible over all kinds of roads and we have yet to hear of a dissatisfied customer.

OUR OFFER: Small Equipment for 7-in. yoke props. 2 7-inch Headlights, either copper or brass trimmed as specified, and a No. 2 Peck Touring Generator, **$35.00.** Large equipment for 8¼-in. yoke props. 2 8-inch Headlights, either copper or brass trimmed as specified, and a No. 2 Peck Touring Generator, **$40.00.**

All Pilot Lamps Fitted with Bausch & Lomb Mirror Reflectors

THE SCOVILLE & PECK CO., New Haven, Conn.

The Watres Power Brake stands for perfect control. It works like an air brake and means all to an automobile that the air brake means to railroading.

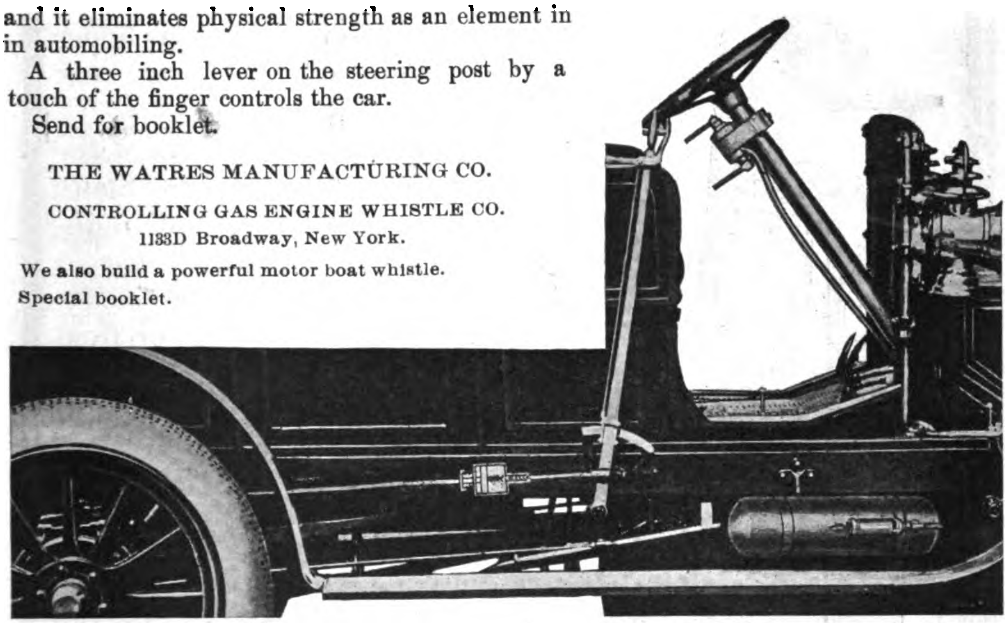
The engine gives the power (spent gas) and the same power blows a Signal Chime and fills the tires. The Watres is not a substitute or additional brake, but a sensitive, powerful control for the brakes now on the car. It eliminates the danger from brakes not working and it eliminates physical strength as an element in in automobiling.

A three inch lever on the steering post by a touch of the finger controls the car.

Send for booklet.

THE WATRES MANUFACTURING CO.
CONTROLLING GAS ENGINE WHISTLE CO.
1133D Broadway, New York.

We also build a powerful motor boat whistle.
Special booklet.



ALUMINUM
CASTINGS
BRONZE

LIGHT, HEAVY AND COMPLICATED

**For BEARINGS
For GEARS "A" METAL shows Best RESULTS**

FINISHED PARTS

BRONZE-GEARED CIRCULATING PUMPS

Special Parts Finished Complete Ready for Assembling

MATERIAL AND WORKMANSHIP

CASTINGS in all non-ferreous alloys exactly adapted to customer's particular requirements. **CASTINGS GUARANTEED PERFECT** and true to pattern, and machine work accurate to specifications.

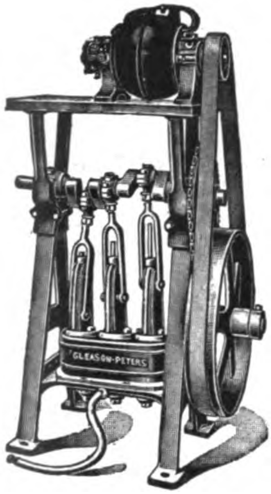
DELIVERIES ALWAYS AT TIME PROMISED

WRITE TO US FOR ESTIMATES

M. L. OBERDORFER BRASS COMPANY, Syracuse, N.Y.

MR. GARAGEMAN

INFLATE YOUR TIRES IN FIFTEEN SECONDS!



The famous **G-P** triple cylinder garage power pump and air storage tank does the trick.

Now being used in 50 per cent. of the up-to-date garages in the United States and without exception considered indispensable.

Driven by one-half horse power electric motor, high-speed gas engine, or from countershaft direct.

Write for 1906 catalogue and full descriptive matter. DO IT NOW.

GLEASON-PETERS AIR PUMP CO.

181-183-185 Mercer Street **New York**

The largest and oldest exclusive pump house in the world.

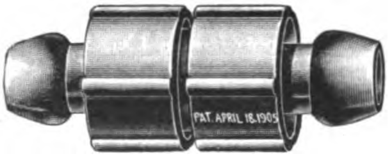
W. H. SIMMONS, President. JOSEPH DIETERLE, JR., Vice-Prest. JOHN EICHERT, Sec'y & Treas.

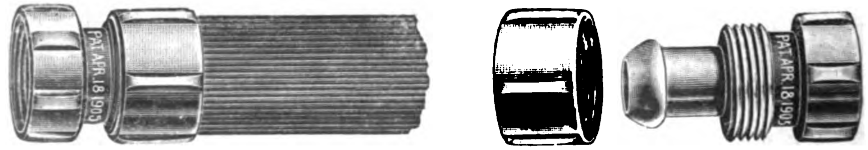
AUTOMOBILE MANUFACTURERS

TAKE NOTICE ! ! !

Pittsburgh Hose Connectors

SHOULD BE USED **ON EVERY AUTOMOBILE**





Positively will not leak or get out of order; are readily connected; and are made for any size Hose, doing away with Washers, Clamps and Wires.
Requires no tools for connecting same.

IN ORDERING CONNECTORS IT IS ONLY NECESSARY TO STATE INSIDE AND OUTSIDE DIAMETERS OF HOSE

PRICES UPON APPLICATION

PITTSBURGH HOSE CONNECTOR CO., Sole Manufacturers

2623 Sarah St., South Side, **PITTSBURGH, PA.**

THE JONES SPEEDOMETER
For *This* Reason: (No. 1.)

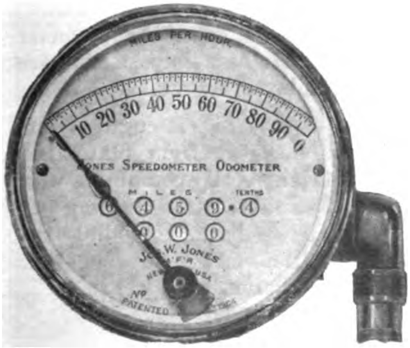
Some indicators show SPEED by means of numerals bobbing back and forth behind a small aperture. It is difficult to tell the speed while traveling slow—and hardly possible while traveling fast. A moving dial with unsteady numerals and a permanent indicating hand is therefore **not practical.**

Other indicators show the speed by means of a small pith ball in a glass tube. By careful study of certain figures to right and left the driver may be able to approximately locate the position of this ball; he never knows his exact speed.

With the **JONES SPEEDOMETER** the driver tells his speed by the position of a prominent black hand, which points steadily to large, plain, black figures on a white dial. **Everything is plainly in sight, all the time.** The driver learns to read his speed simply **by the angle of the indicating hand,** precisely as he reads the time, by the direction of his watch hands.

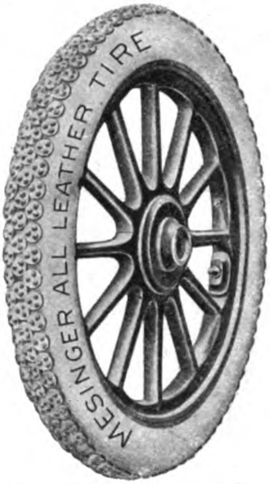
The **JONES SPEEDOMETER** is the only instrument having all the spaces in the speed scale of **equal length,** making it as easy to read a high speed as a low one. There are many additional features shown in our complete catalog; this will be mailed free upon request.

JONES SPEEDOMETER
124 West 32nd St., N. Y.



The MESINGER
ALL LEATHER
Pneumatic Tire
NO RUBBER

Guaranteed for six months against Rim cuts and Blowouts



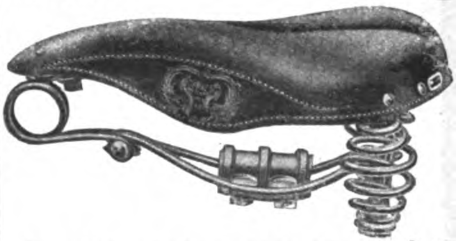
Made to fit clincher rim. When ordering only state what kind of rim and size of Tire.

First set ran 2,800 miles in eight months without causing any trouble through icy and rough roads and they still wear very well.

A regular inner tube can be used in our casing. Our leather is perfectly waterproof, the tread is anti-skit and can be renewed.

H. & F. MESINGER MFG. CO.,
1801-1807 First Ave., New York

Mesinger Motor Saddle 1906. The ORIGINAL American Motor Saddle. Strength and comfort.



Free action in front suspension spring the rider to proceed at high speed over all obstructions.

The only coil hair padded suspension saddle Two telescope springs in the rear make comfortable riding on rough roads. Make Motor Cycling more tractable. We also Manufacture a full line of bicycle saddles.

H. & F. MESINGER M'F'G CO.
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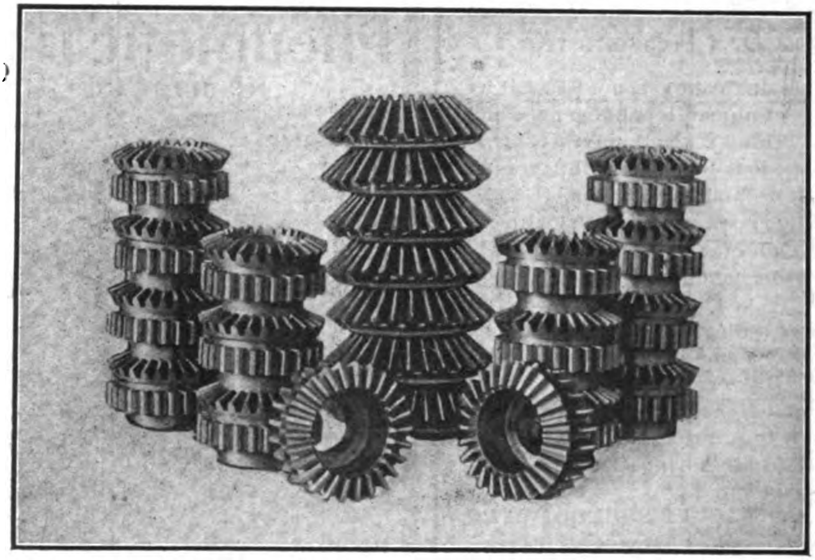


GEARS CUT PROMPTLY

THE NEW PROCESS RAWHIDE CO., SYRACUSE, N. Y.

Features of Diamond Chains

Stock The steel we use comes from billets of special analysis. No shipment is accepted until it has been thoroughly tested in all stages of manufacture. When it is thus tested it enters our stock room as perfect and is ready for subsequent operations.

Side Links Side links are punched lengthwise of the steel strip. To obtain a perfect bearing for the shoulder of the rivet or bushing a small hole is first punched in the link and then reamed to size. This increases the tensile strength of the links and materially add to the durability of the chain.

Rollers Rollers are reamed to size and fitted to special micrometer gauges. All pieces showing the slighest imperfection are destroyed. Bushings are gauged in a manner similar to rollers.

Rivets Tests prove that the tensile and shearing strength of our standard rivet—made of nickel steel—is from 50 to 100 per cent. higher than those made of any other material. By combining with this exceptional rivet a heavy side link of high carbon stock and a bushing and roller of similar quality, and making all moving parts hard, including the rivet, we have practically eliminated the elongation from fatigue of material, and to as great a degree as is possible reduced the elongation from wear.

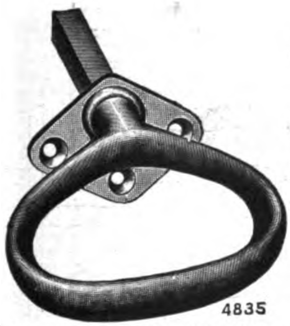
"Diamond" chains are unequalled for accuracy of manufacture, strength and durability.

DIAMOND CHAIN & MFG. CO. Indianapolis

Shakespeare said: "The apparel oft proclaims the man."
Smith says: "An automobile is often judged by the quality of its fittings."

If you want the best fittings on your automobiles, buy the "RELIABLE." They are made from a special mixture of metal which gives them the strength of the best bronze and that rich, golden yellow appearance which is so attractive.

We carry a full line of specialties, in addition to brass rails, wind shield fixtures, lamp brackets, etc. ¶ You should have our printed matter. ¶ It is yours for the request.



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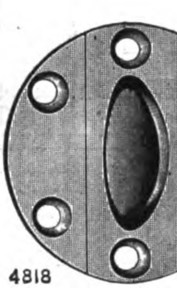

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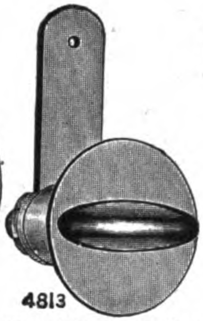

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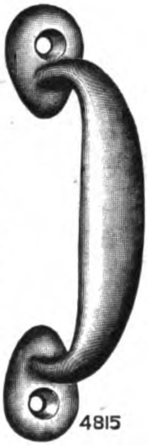
Two of the most popular Heel Board Catches made



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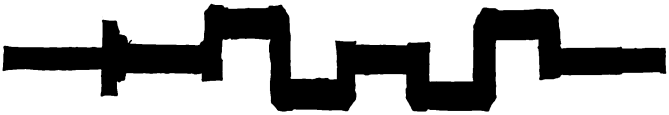
Popular Seat or Body Handle

JOS. N. SMITH & CO.

Fourth and Porter Streets **DETROIT, MICH.**

CARPENTER



Crankshafts and Axles forged only in Slab Form, slotted and finished to size; then oil treated in our Projectile Department. Shafts and Axles thus made of our No. 317 AUTO NICKEL-CHROME STEEL average:

TENSILE STRENGTH 130,000 lbs. ELONGATION 19 per cent.
ELASTIC LIMIT 114,000 lbs. REDUCTION OF AREA 60 per cent.

SPECIAL ALLOYED STEELS FOR

GEARS, SPRINGS, VALVES, FORGINGS, Etc.

THE CARPENTER STEEL COMPANY

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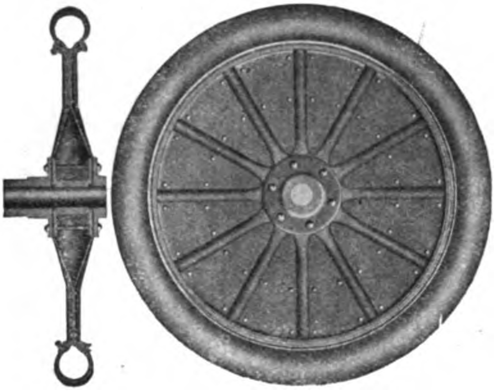
SAFETY
SPEED
SATISFACTION

The Indestructible Steel Wheel

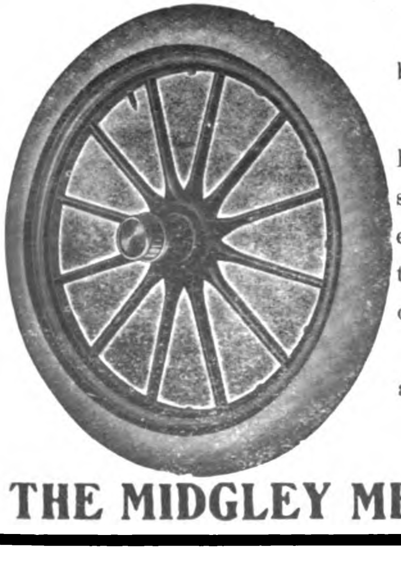


YOU have probably noticed that many racing machines cover the spokes to avoid wind resistance. This is proof positive that this type of wheel is speedier than the ordinary spoke wheel. Our construction also makes it lighter, and considerably stronger. There is no danger of its collapsing under sudden strain as the result of a burst tire With the increase of horsepower and speed of automobiles, there are increased dangers. These should be minimized. The wheel is one of the chief items to be considered. Our construction is the solution of the problem. In appearance it is really artistic. It is just a question of becoming accustomed to this construction, and after they are universally used, the other style of wheel will look antiquated and peculiar. No other wheel construction should be used for commercial vehicles. Their strength makes it absolutely necessary for this type of vehicle. Manufacturers first to adopt it will profit as a result of giving to their trade something new and something better. Write us for further information.

TURNER & FISH,

21 Quincy Street CHICAGO. ILL.

AVOID ACCIDNETS
BY USING
Midgley Pressed Steel Wheels.



They are made entirely of sheet steel brazed together.

They have a large surplus of strength held in reserve for resisting violent thrusts, shocks, and side-swipes. Positively the strongest wheel obtainable for automobile purposes at the same time possessing a degree of lightness comparing with wood artillery wheels.

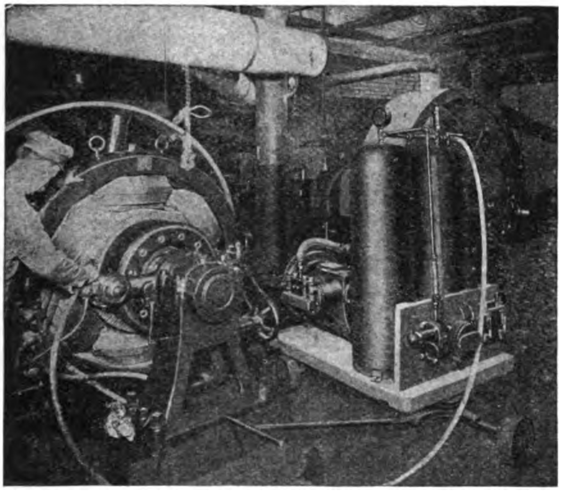
The only automobile wheel which gives absolute assurance of safety.

(See our latest model on 1906 Autocars)

THE MIDGLEY MFG. CO., Columbus, O.

WESTINGHOUSE

Motor=Driven Blowing Outfits



Are compact, portable arrangements especially adapted for use in automobile garages to supply compressed air for inflating tires, dusting out vehicles or cleaning their mechanism, also for cleaning any generators or motors which may be in service. They are made for use on either direct or alternating current circuits.

The illustration shows one of the outfits in service, being used in cleaning a generator. Note the reservoirs and motor compressor firmly attached to truck, while the board in front carries the necessary switch, governor, fuses, etc.

The Westinghouse Air Brake Co.

The Air Brake Builders. Pittsburg, Pa.

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FREE

WE will send you one of these fine Regulator Clocks, 38½ inches high and 16½ in. wide, case solid oak, 8 day movement constructed of brass and steel and fully guaranteed, in return for 24 Neverleak Certificates. Any Brass Sign certificates that you may have on hand or hereafter obtain through purchases of Neverleak, will be allowed to apply on the clock. The clocks are very superior in every way, and one of them will be an ornament to any office, shop or store. One certificate is enclosed with each dozen 4 ounce tubes of Neverleak. 12 certificates will entitle you to the Brass Sign as heretofore, 24 certificates will secure the Clock.

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BUFFALO, N. Y.

Remove the dirt and water from your gasoline

and be free from trouble in pipes, tanks and carburetors, which you have wrongly attributed to defective sparking, broken electric connections, poor mixtures or other engine troubles.

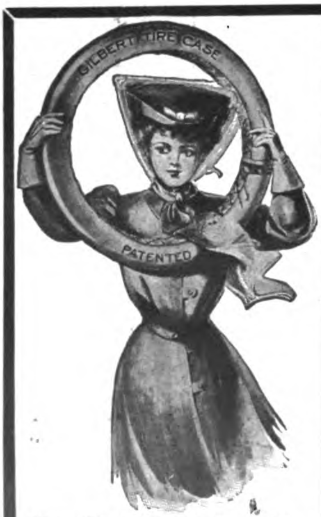
Boss Filter

guarantees a supply of pure gasoline to the engine of your motor-car or boat. Connects with the gasoline pipes and doesn't decrease the original pressure of the gasoline—inlet and outlet are on the same level.

$3.50 delivered anywhere in the U. S.

Write for booklet A and proposition to agents.

William S. Jones, 112 North Broad St., Philadelphia.



New Style Self Fastening

Water Proof.

PRICES:

Enamel Duck	$4.00
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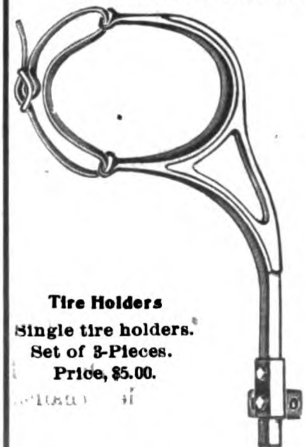
GILBERT AUTO FABRIC SUPPLIES The Only Ones Worth Considering.

Cuts show side pieces, of which there are 2 in a set.

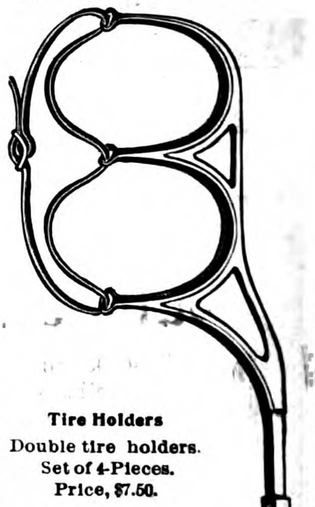


Tire Holders

Single tire holders.

Set of 3-Pieces.

Price, $5.00.



Tire Holders

Double tire holders.

Set of 4-Pieces.

Price, $7.50.

Gilbert Tire Holders are made in Aluminum, and are adjustable fitting any car.

Single tire holders.	Double tire holders,
Weight, 2¼ lbs. set.	Weight, 3½ lbs. set.

Sold by Leading Supply Firms.

GILBERT MFG. CO.

NEW HAVEN, - - CONN.

IN QUANTITIES ONLY

WE MANUFACTURE FRONT AND REAR AUTOMOBILE AXLES COMPLETE READY FOR PAINT.
MATERIAL, WORKMANSHIP AND EFFICIENCY THE BEST.
PROMPT DELIVERY AND FAIR PRICES

THE AMERICAN BALL BEARING CO.
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HIGH SPEED TOOLS

We make them of every description.
These are the tools for boring, reaming, drilling and milling, and will increase your output six to eight times. THEY ARE FULLY GUARANTEED.
WRITE US FOR CIRCULARS AND PRICES.
We also manufacture of Bessemer or special nickel steel, automobile parts, such as gears, shafts, cups, cones, transmissions, engines, etc. Send us blue prints for prices.

AMERICAN DIE & TOOL CO.
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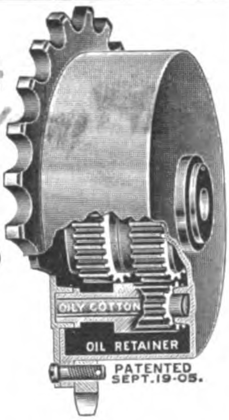
Cullman Sprockets

in stock and to order for Baldwin Diamond and Whitney Block and Roller chains. Chains carried in stock.

Cullman Differentials

simple, oil retaining and dust proof in three sizes for light, medium and heavy automobiles.

Send for new catalogue.



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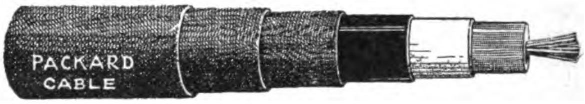
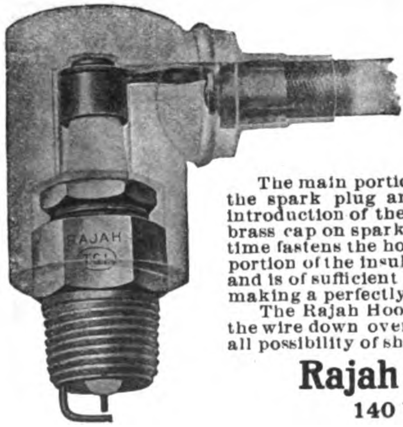
Every Foot of Packard Enameled Cable is Right



Why? Because the last thing we do before shipping it is to give it a

30,000 VOLT TEST

The PACKARD ELECTRIC CO., Warren, Ohio, U. S. A.



The Rajah Spark Plug Hood

"RAJAH"

IGNITION ABSOLUTELY SURE

The main portion of the cap is of porcelain, which completely covers the spark plug and has a neck on one side recessed to permit the introduction of the Rajah Clip Terminal, which engages the slot in the brass cap on spark plug, making a perfect connection and at the same time fastens the hood in position. A piece of rubber tubing covers a portion of the insulation of secondary wire, and ferrule end of terminal and is of sufficient length to be stretched over the neck of the hood making a perfectly water-tight connection.

The Rajah Hood and rubber connection carries the insulation from the wire down over the spark plug to the cylinder head, thus obviating all possibility of short circuiting.

Rajah Auto-Supply Company

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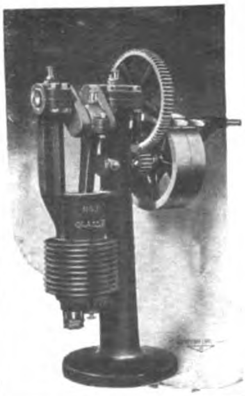

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SINGLE AND THREE CYLINDER STYLES

Just the thing for public or private garage for inflating tires, cleaning cushions, etc.

Automobile Gear and Sprocket Work

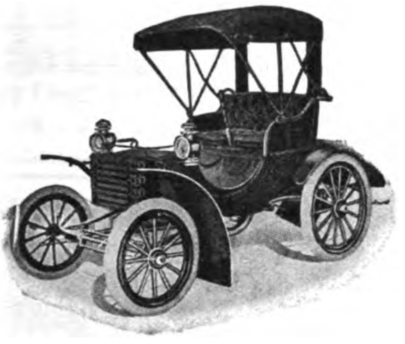
of every description

Transmissions, Automobile Machine Parts, Piston Rings, etc.

Season Contract Work Specially Solicited.
Send us your specifications.

The F. W. SPACKE MACHINE CO., Indianapolis., Ind., U. S. A.

An Inch of Slip is Worse Than a Mile of Roll



Have you ever thought that practically all the wear on auto tires is caused by slipping, and that if a tire rolls without slipping it will wear almost indefinitely? That is one of the reasons why front wheels wear longer than rear and why the tires on DURYEA autos wear from three to six times as long as the tires on others. DURYEAS are very light, from 900 to 1500 lbs A large proportion of this weight is carried on the rear or driving wheels, which are very large, 36 in. and so have a long surface of contact with the road; these do not have to push heavily loaded front wheels ahead of them. This, combined with the fact that they carry most of the weight of the vehicle, makes them stick to the road, no matter how slippery it is. They never slip. This is only one of the many practical points in which DURYEAS excel. Will be glad to tell you others.

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Hockley St., Reading, Pa.

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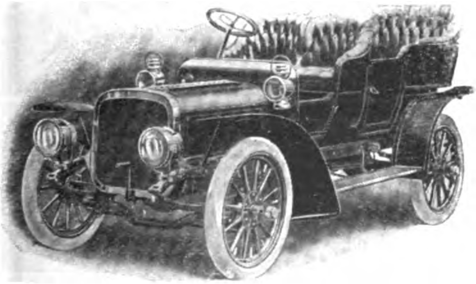
The Car for to-day, to-morrow and years to come.
Built by practical men.



24 H. P.—Four Cylinders—45 Miles an hour—Five Passengers—weighs Under 2,000 Pounds. Price F. O. B. Detroit, $2,800.

No other car ever made met with such instantaneous commendation and approval as the Aerocar. Beauty of design, size, finish, appearance, and its practical mechanical construction, coupled with its perfect air-cooled motor, gave it at once the confidence and admiration of authorities on motor cars.

The public liked it, too—caught the eye—caught the fancy—because it embodied the ideal of a motor car.

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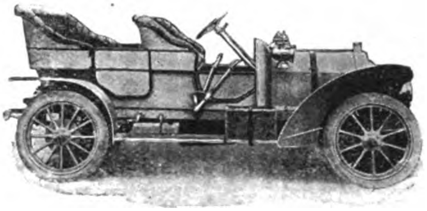
OLDSMOBILE



Palace Touring Car Model S
PRICE $2250

Accessibility of parts is not a new idea with the Oldsmobile. It's fundamental. On your written request we will arrange a demonstration which will talk more convincingly than pages of statements Such a demonstration places you under no obligations to buy. All we want is a chance to place the merits of our cars fairly before you in a more effective way—you know the old saying, "Seeing is believing."

The Double Action Olds Model L is certainly a "star performer," both in the matter of exciting comment and in showing results. It's hard to get away from the extreme simplicity of its construction. With a working stroke to every revolution, idle strokes are cut out, and there are only three working parts to the motor. The Double-Action Olds pushes through sand and mud and climbs hills on direct speed. Its price $1250. Write for Double-Action booklet.

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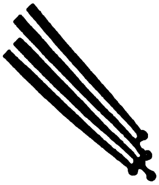

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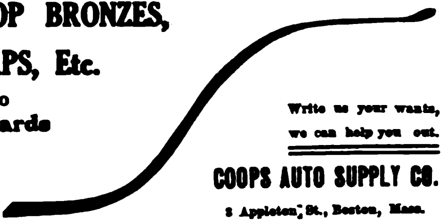

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we can help you out.

COOPS AUTO SUPPLY CO.
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A strong and simple device for removing taps broken off in a tapped hole. Works quickly and easily and will not injure the work. A time and money saver; always ready for instant use.

Write for circulars and price list.

Also makers of the Atlas Swivel Vise and Atlas Tool Maker's Vise

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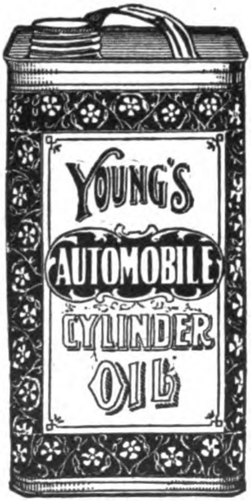
ATLAS MACHINE COMPANY, Providence, R. I.



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Best Oils
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When you are through experimenting,
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The Morse Frictionless Rocker Joint Chains

Always Give Satisfaction

The only chain having a Frictionless Rocker Joint

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PENNSYLVANIA
CLINCHER = RACING TYPE
We Allow 20% on Old Tires

Built for
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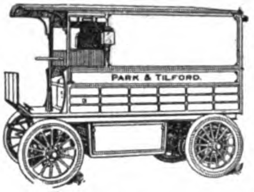
For Every Requirement



The Common-Sense practical features of our electrics, place them at the head of their class for business purposes and social needs.

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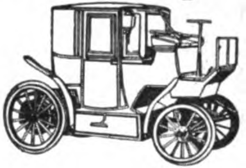


Vehicle Equipment Co.

BORDEN AVENUE, LONG ISLAND CITY, N. Y.

Largest Builders of Electric Vehicles in the World

Compound

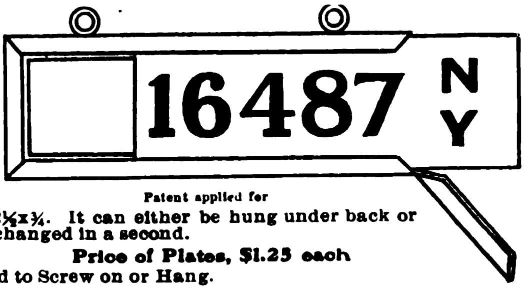
Always Reliable and Economical.

Complete Catalogue Mailed Upon Request.

THE E. H. V. COMPANY, Middletown, Conn.

Don't hang your car
full of numbers, get

CORAM'S License Rack



Patent applied for

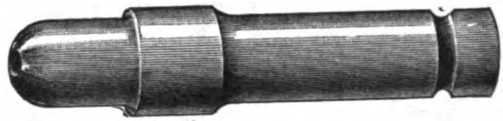
This rack will hold 6 license plates.
Rack and plates are made of brass and will not warp or curl; size 4⅛x12½x¾. It can either be hung under back or screwed to flat surface. Plates can be changed in a second.

Price of Rack, $2.00 each **Price of Plates, $1.25 each**

In ordering give size of Number and to Screw on or Hang.

Made in Baltimore, Md. by W. H. CORAM, 537 N. Fremont Ave.

Imperial Porcelain Sparking Tubes



MANUFACTURED BY

The. Imperial Porcelain Works, Trenton, N. J.

When desiring quotations always send sample or drawing of style required.

THE JEWELL

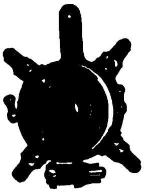
A Perfect Car for $400.00

The Business and Professional Man's Car

WATCH THIS SPACE

THE FOREST CITY MOTOR CAR CO., Massillon, Ohio

The LEAVITT SECONDARY DISTRIBUTOR



Leavitt Timer

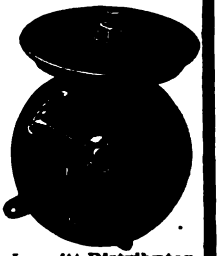
Through its **unequaled simplicity** has clearly proven the superiority of this system of ignition. The past season's success has proved our claims.

Our primary timer is the fastest made, the least effected by wear. We have **absolutely solved** the question of **burned contact points.**

Our goods are fully guaranteed.

Submitted to Manufacturers on trial.

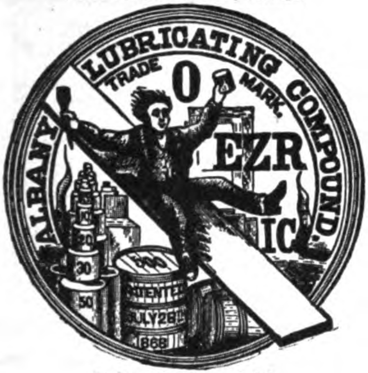
SEND FOR CATALOGUE AND PRICES.



Leavitt Distributor

UNCAS SPECIALTY CO., Norwich, Conn.

This Trade Mark on Every Package.



Registered U. S. Patent Office.

Look out for Yellow Label

Use Albany Grease

FOR YOUR AUTOMOBILE

It Is the Best, Cheapest, Cleanest and Safest Lubricant Known.

It will not gum, prevents rust, reduces friction, does not drip, prevents hot boxes, keeps your motor in perfect running order, saves expenses and repairs and will not freeze.

It is the Standard Automobile Lubricant and is used by most manufacturers of automobiles to start their new machines.

Use No. 2 grade for Winter and No. 3 for Summer. For transmission or ensemble gears, use No. 1 in Summer and No. 0 in Winter. The quality of the grades is the same; the difference is only in consistency.

ONLY MADE BY

ADAM COOK'S SONS, 313 West St., N. Y. City

Clutch Leathers

CUT FROM THE FINEST IMPORTED SWISS HIDES AND CURRIED BY OUR SPECIAL PROCESS TO MAKE THE LEATHER FIRM, TOUGH AND FROM ⅛″ TO ¼″ IN THICKNESS.

Fan Belts

V SHAPED OR FLAT AS REQUIRED. CAN BE MADE TO FIT ANY GROOVED PULLEY. MADE ENDLESS OR FITTED WITH DETACHABLE COUPLINGS. SEWED WITH WAXED THREAD OR CABLE SCREWS.

Hoso–Tubing–Gaskets

SPECIAL OIL PROOFED IDEAL INSULATION—VERY TOUGH AND MADE ESPECIALLY FOR AUTO TRADE.

The Republic Belting & Supply Co.

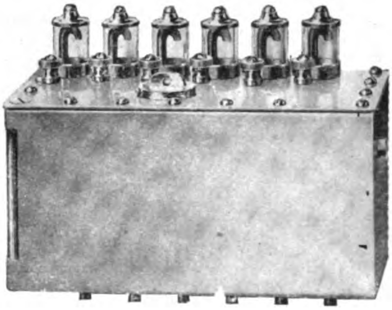
CLEVELAND, OHIO

MFRS. LEATHER BELTING

McCanna

FORCE FEED

Lubricators



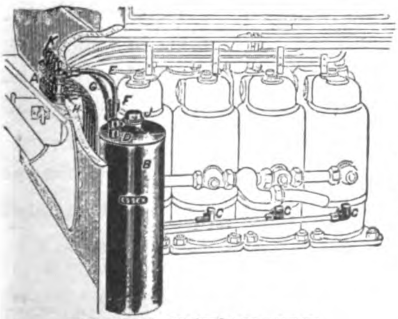
Made of any capacity, any number of feeds. Either rotary or ratchet drive and of finish desired. We publish a booklet giving a lot of information about oiling and oiling devices. We will gladly send this for the asking.

McCord & Company

1401-1480 Old Colony Building

Chicago, Ill.

E. J. DAY & CO, Pacific Coast Distributers
324-826 Golden Gate Ave., San Francisco, Cal.



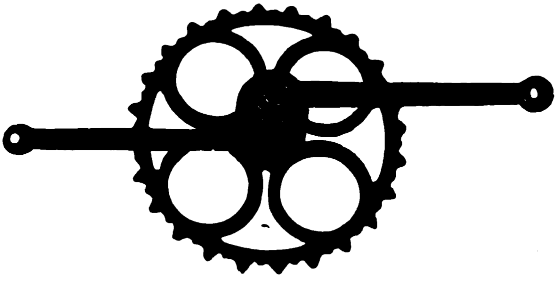
ESSEX IMPROVED

Automatic

Lubrication is the only successful method of lubricating **Automobiles. Always ready** and never get out of **order. 20,000** in use.

G. B. ESSEX BRASS CO.

DETROIT, MICH.



HART REPAIR HANGERS WILL FIT ANY BICYCLE

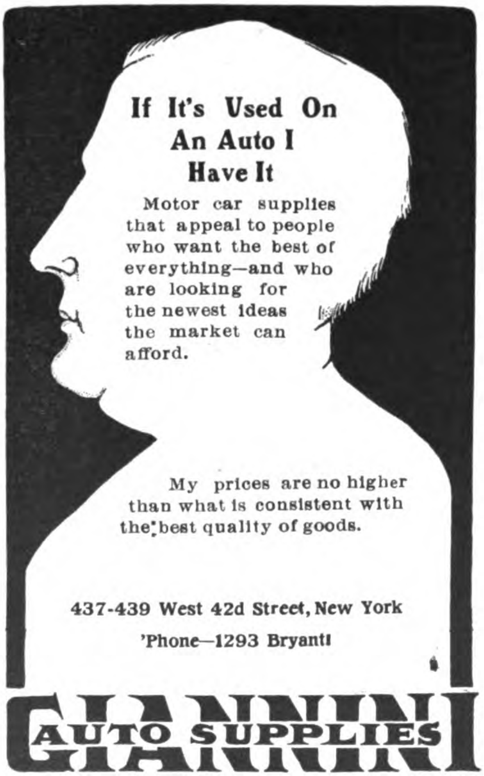
We furnish ball cups and cones in every 1-64 of an inch from 1,1-2 to 2,1-16 in., also seven lengths of shaft.

In ordering send inside diameter of bracket or one of the old ball cups and the width of bracket.

Hangers complete with 22, 24, 26 or 28 tooth sprockets, $3 75.

We manufacture this Hanger and can fill orders promptly. They are guaranteed. Discount to the trade.

Hart Manufacturing Co.
370 Atlantic Ave., Boston, Mass.



If It's Used On
An Auto I
Have It

Motor car supplies that appeal to people who want the best of everything—and who are looking for the newest ideas the market can afford.

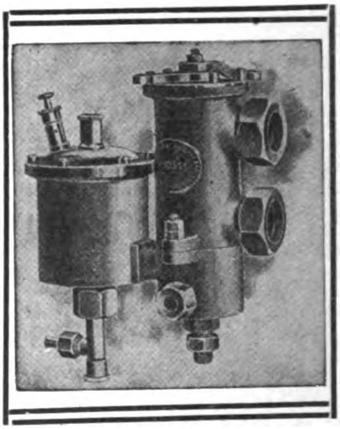
My prices are no higher than what is consistent with the best quality of goods.

437-439 West 42d Street, New York
'Phone—1293 Bryant

GIANNINI
AUTO SUPPLIES

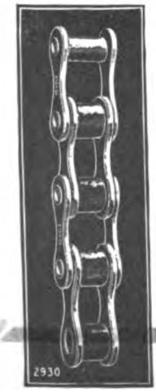
LONGUMARE CARBURETORS

The Longumare Carburetor is famous on both sides of the Atlantic Ocean. It always has been and always will be the standard for quality and reliability. It costs no more than other makes. Why not have the best.



The latest improved and self-regulating type. Carburetor troubles often condemn a car. It is economy to get the best.

Bradford Motor Works,
Sole Licensed Manufacturers in the United States, of the Longumare Carburetor.
Bradford, Pa.



RENOLD ROLLER CHAIN

A high-grade, machine-made steel chain, very light in weight, and consequently saving of power. Case hardened rollers, bushings and pins insure great durability. Especially adapted to use on automobiles. Write for booklet and full description.

Philadelphia The Link-Belt Engineering Co. Philadelphia

NEW YORK, 49 Dey Street.
PITTSBURGH, Park Bldg.
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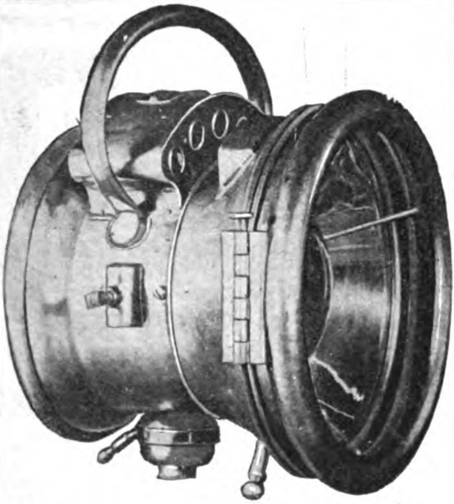


The highest grade Lamp that can be built. We are selling it at a popular price.

Write To-day for Description and Price

The Auto Accessories Mfg. Co.

265-7-9 Jefferson Ave., - Detroit, Mich.

TRADE MARK

Powco

STEEL BELT

for fan or oil-pump

A leather belt can't touch it for trouble-saving and long wear. Won't slip, stretch or break. Easy to put on; easy to take off.

"Lasts as long as the car"

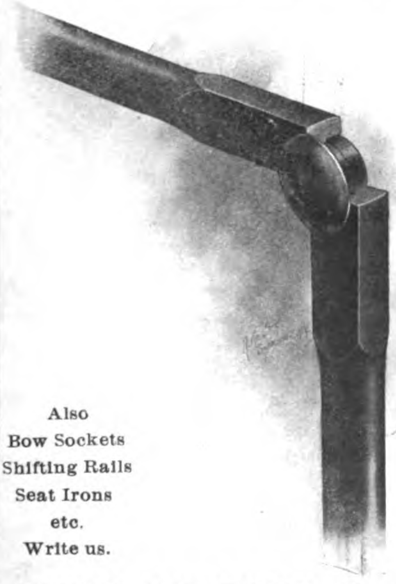
$3. Money back if not satisfactory. Your dealer has it. If he can't supply you, send us **$3** and the length of your present leather belt with make and year of car. Write anyway for circular E.

Philadelphia Ornamental Wire Co.

628 Filbert Street Philadelphia

.·.FINISHED TOP JOINTS.·.

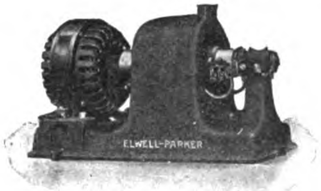
For all Kinds of Tops



Also
Bow Sockets
Shifting Rails
Seat Irons
etc.
Write us.

CORTLAND FORGING CO.

Cortland, N. Y.



We are manufacturing charging machines of very high efficiency and durability with Hess-Bright ball bearings and other up-to-date features. Standard sizes for charging 12 and 24 cells.

We have designed and are building electric wagons and trucks of very high efficiency and mileage for loads from 500 lbs. to 15,000 lbs.

The Elwell-Parker Electric Company

OF AMERICA

CLEVELAND, OHIO

A PERFECT LUBRICANT

HELMET OIL

CHARLES H. BESLY & CO. SOLID OIL TRADE MARK REGISTERED. CHICAGO, ILL. U.S.A.

Bearings Packed with Helmet Oil
require attention at long intevals only

C. H. BESLY & CO., 15-17-19-21 S. Clinton St., Chicago, Ill.

NO JOLTS, JARS or REBOUNDS

The Supplementary Spiral Spring absorbs all vibration and acts alike under heavy or light loads. It is the rear seat of an automobile that gets the shocks. It is the **SUPPLEMENTARY SPIRAL SPRING** which relieves the jolt. Saves engine, tires and springs and makes automobiling a pleasure.

Patented.

CHARLES E. SWINGLEY, Chief.
ROBERT O. JENKS, Sec'y.

City of St. Louis.
Fire Department, Chief's, Office
May 2nd, 1905

Supplementary Spiral Spring Co., City.

Gentlemen:—Your Supplementary Springs are giving entire satisfaction on automobile used by myself responding to fire calls. The most noticeable effect is that they permit my car to maintain its speed over car crossings and granite streets, with full comfort to the occupants.

Yours truly,
C. E. SWINGLEY,
Chief Fire Department.

Supplementary Spiral Spring Co., 4522 Delmar Ave., St. Louis, Mo. Eastern Agents: Auto Cover & Top Mfg. Co., 148 W. 56th St., N. Y. City

TIRES

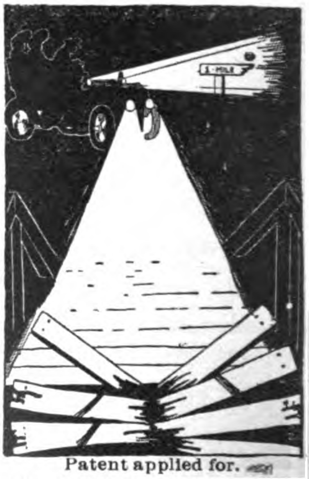
28x2½ . .	$10.00
28x3 . .	12.00
30x3½ . .	14.00

All new clean stock cost us just double, we are overstocked. Other sizes in stock, write us what size you want, when ordering state how many lugs and whether for wood or wire wheels.

Bicycle Tires, 10 prs. lots, $1.50 pr.
Mirror Lens Searchlights, list $40.00, our price $6.50 ea.
Bullet Lamps, Mirror Lens, $5.50 ea.
Generator for two Lamps, $5.50 ea.
Carriage Tires, all sizes 1-3 reg. price.
Big Horns, regular price $6.00, our price $1.65.

A. H. KASNER
LARGEST TIRE DEALER IN U. S.
152 Church St., - - N. Y. City

Control Your Lights From Your Steering Wheel



Patent applied for.

and know not only what's straight ahead of you on a dark night but also what's 'round the turns, before you make them.

Put your lamps on **THE IMPERIAL-LYON AUTOMATIC LAMP ADJUSTER** and ride in absolute safety, no matter how dark the night. ¶ The Imperial-Lyon is one of the best devices ever applied to an automobile. It fits any make of car; carries any make of lamp. Turns with the wheels—as fast or faster when so adjusted. ¶ Strongly, substantially made in solid brass. Handsome in appearance.

Write for circular describing this and other high class automobile accessories.

IMPERIAL BRASS MFG. CO., 242 S. Jefferson St., Chicago, Ill.

NON-FLUID OIL

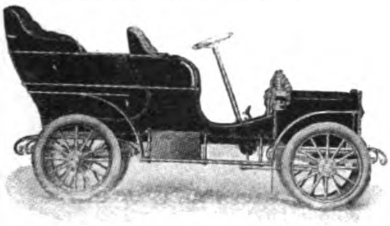
The lubricant that is **all** used for lubricating. The lubricant that cannot drip, leak out and waste away while the gears and bearings run dry.

Non-Fluid Oil lubricates better and lasts longer than any fluid oil or grease you can buy, **irrespective of price.**

Generous test samples free on request.

NEW YORK & NEW JERSEY LUBRICANT CO.
14-16 Church St. Dept. D **New York City**

BODY BARGAINS



We have ten NEW bodies like above to offer at $60 each. Perfectly finished and upholstered. Write for particulars now as they must be sold immediately.

NORTHERN MANUFACTURING CO., Detroit, Mich

Thompson's "Auto Record"

Enables the automobilist
to keep an accurate record

Convenient No Effort Required

Simply fill in blank spaces showing route traveled—time consumed—miles covered—expenses incurred—names of those making tour and interesting happenings.

PRICES

"Auto Record" Tablets, containing 50 pages, .	$ .25
Leather Covers, seal finish, 4½ x 7½ . .	1.00
Or 5 Tablets and 1 Leather Cover . . .	2.00

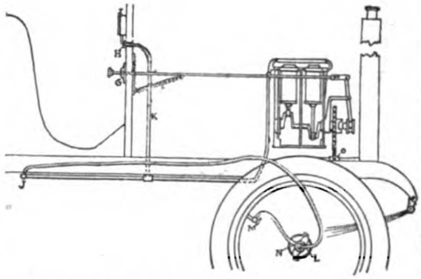
Compact—Concise—Condensed—Strictly first class

Order promptly or write for specimen sheets.

G. L. THOMPSON, 3415 N. 21st St., Philadelphia

Stop Worrying

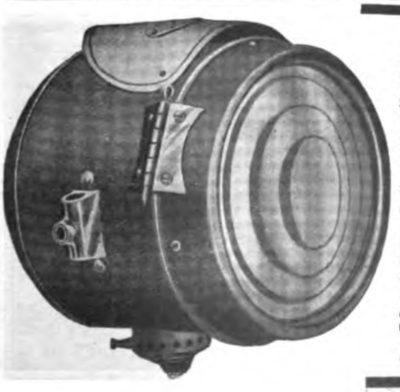
Install our TIRE PUMP in your car, and punctures will have no terrors for you.



It is positively driven from the engine crank-shaft and is engaged and disengaged by means of a clutch. Tires can be kept perfectly inflated, while running, even if punctured, as the pump forces air in the tire faster than a puncture will let it out.

You should have it on your car. Write for full information and price.

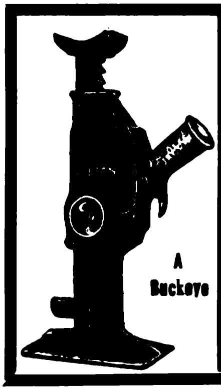
The Tiley-Pratt Co.
Essex, Conn.



THE STANDARD LINE is just what the name implies, with years of experience and ability behind it. Four styles of Parabolense Head-Lights; six styles of Mangin Mirror Search and Head-Lights; four styles of commercial Vehicle Head Lights; three styles of Limousine oil side lamps; three styles of Automobile oil side lights; three styles of Automobile tail lights; five styles of generators and many styles of Electric lamps.

All goods strictly high grade and guaranteed. The most complete line in its entirety offered for 1906, and all, for only a little more money than is asked for the kind that adds to your troubles. Write for new illustrations and prices.

STANDARD CARRIAGE LAMP CO.
43 & 49 So. Canal St., Chicago, Illinois.



BUCKEYE JACKS

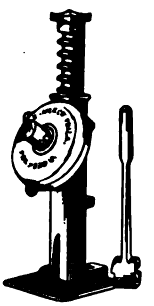
are not **CHEAPLY CONSTRUCTED.** We are ready to doff our hat to any one producing a better Jack. Thus far no one has the ability to remove the **BUCKEYE HAT. BUCKEYE JACKS** have not been "adopted by **ALL** the Mfrs.," but we could produce a list of **REPRESENTATIVE MANUFACTURERS** which equals any other list, with whom we have contracts and who are **SATISFIED.** The Jobbers are **SATISFIED** and last, but most important, the User is most **SATISFIED.** Don't be "fooled." Buy **BUCKEYE JACKS** and all be **SATISFIED.** Correspond with

THE BUCKEYE JACK MFG. CO., Louisville, Ohio

Globe Automobile Jack

Light and Powerful

Simple and Positive



The **GLOBE AUTOMOBILE JACK** is the most reliable jack made There is no intricate mechanism to get out of order, since it consists of only two working parts, a rack and worm of peculiar construction. It is always locked in any position and cannot slip. Being but 10½ inches high, it takes up very little space when carried in the automobile. It is made of the best grade of malleable iron, and is light, powerful and compact.

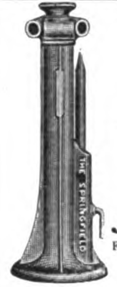
The **GLOBE JACK** will fit under the axle of any 28 inch wheel, which makes it very convenient for shop use, where machines are handled before tires are put on. As it will lift to a fraction of an inch, it can be utilised to adjust parts of machines and bodies into place. It is adapted to any style of machine, and will handle the heaviest automobile made.

Discount to the Trade

MANUFACTURED BY

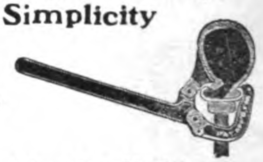
Globe Jack Company

827 N. Fourth St. Philadelphia, Pa.



Strength, Safety, Simplicity

in the



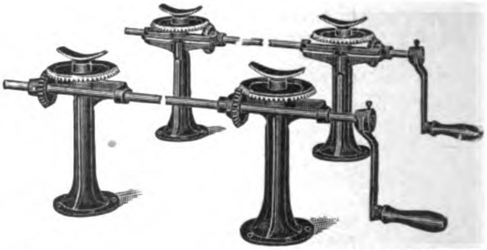
Springfield Jack and Tire Tool.

For any car weighing from 500 to 4000 pounds
For removing any Clincher Tire
from 2½ to 4½ inches.
Sold by all dealers.

REST YOUR TIRES

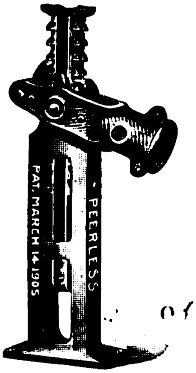
with a "SPRINGFIELD" LIFT

You turn the cranks and the four wheels will rise 7 inches off the floor



Showing lift in position to receive car. Actual lifting capacity 3500 pounds. Write for descriptive circular and price.

THE SHAWVER CO.
Springfield, Ohio.



Peerless Automobile Jacks

U. S. and Foreign Patents Granted

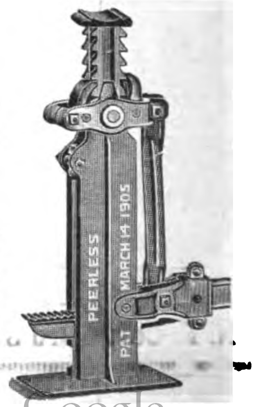
A model of simplicity, durability and strength. Raise by working handle below center; lower by working handle above center. Works at any angle. Can not slip or drop.

Most Popular Auto Jack on the Market

	Height	Rise	Weight	Price
No. 15—For vehicles of 2 tons.	10-in.,	7-in.,	4½-lbs.	$2.50
No. 16—For vehicles of 2 tons.	11-in.,	6-in.,	7-lbs.	3.00
No. 18—For vehicles of 3 tons.	13-in.,	8-in.,	9-lbs.	4.00
No. 21—For vehicles of 10 tons,	13½in.,	7-in.,	21-lbs.	6.00

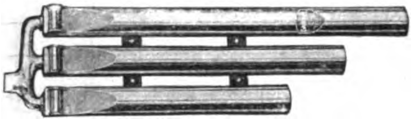
OLIVER MANUFACTURING CO.,

202 S. Desplaines Street, Chicago, Illinois



WARNING

THE Gabriel Horn is fully protected by patents, and dealers and users are warned against purchasing infringing devices. We have recently entered suit in the United States Court against companies which have been displaying and offering for sale an infringement of our patents, and it is needless to



say that we will continue this policy of protecting ourselves and our customers from infringers. When purchasing, be sure the horn bears our Trade Mark.

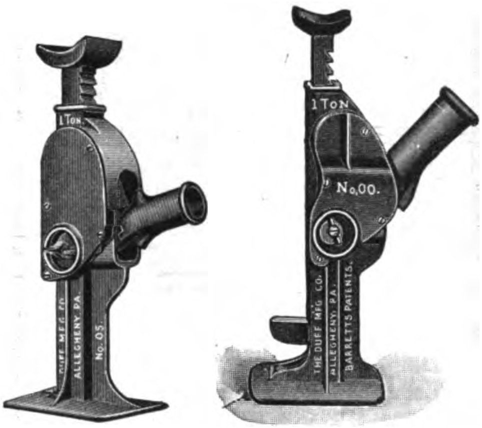
GABRIEL
GABRIEL HORN MFG. CO.
CLEVELAND
&

TRADE MARK

The Gabriel Horn warns without frightening, and has a beautifully modulated chime. **Manufactured in 2, 3, 4 and 8 chimes.**

GABRIEL HORN MFG. CO.
977 Hamilton St., Cleveland, O.

BARRETT JACKS



BARRETT JACKS are especially adapted to automobile use. They have been adopted exclusively by every leading manufacturer and dealer. Barrett Jacks are easily applied to every lifting purpose, and easily removed. They are constructed of the very best material **ONLY** and, therefore, do not compete with inferior jacks made to "look just as good." When you lift an expensive machine, you want to lift it with a **RELIABLE** Jack.

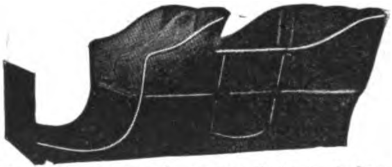
Send for Catalogue No. 21

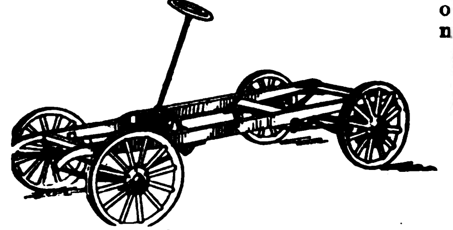
THE DUFF MANUFACTURING COMPANY

Pittsburg, Pa. (Established 1883) Works—Allegheny, Pa.

DOES IT PAY YOU

to build your own auto running gears and are they up to date? We make a specialty of this class of work and make it right. Get our new catalogue at once and see our latest styles. We also make all kinds of bodies, wheels, axles, steering devices, sprockets, etc.





H. F. BORBEIN & CO.,
2108 N. 9th St., St. Louis, Mo.

SAFETY—SPEED—SAVING

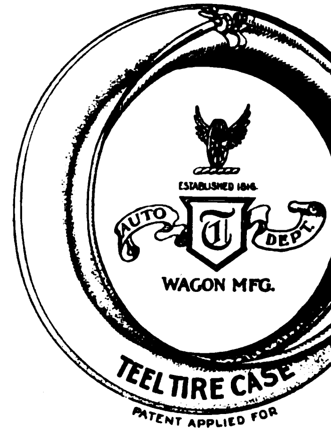
SAFETY. An absolutely safe gasoline tank; it can *not leak* nor explode; can be repaired by candlelight; no gasoline in liquid form.

SPEED. It greatly increases your power; it will make a 40 H. P. car of a 24 H. P. car at a small expense.

SAVING. It *reduces* fuel consumption *one half; saves half* your former *expenses* for gasoline; saves in time and trouble, too.

For all cars and motor boats

The AMERICAN GENERATOR COMPANY
N. E. Cor. 63rd St. and Park Ave., New York City



A water and dirt proof tire cover held in place by two steel wires, doing away with all lacing. It is the easiest attached cover on the market.

Send for circular.

E. TEEL, & CO.
MEDFORD, MASS.

FREE!

A Valuable Help in Engineering Problems

POWER transmission by friction gearing has presented many new problems for the engineer, millwright, machinist, student and owner of machinery. This book contains tables, facts, and formulas for the simple solution of these problems, information to be found in no other book. Carefully compiled by able engineers. Copyrighted.

The circulation of this book will be limited to those who really want it and will send us a postal request stating occupation. To such we gladly send it free. Address

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Indianapolis, Ind., U. S. A.

A Leather For All Kinds Of Weather
Chrome Tanned Automobile Leather

We make a specialty of the smooth finish now so popular. Made in any color in morocco or straight grains, or smooth finish.

The LACKAWANNA LEATHER CO., Hackettstown, N. J.

Western Agents, NEILSON BROS., 209 E. Lake St. Chicago, Ill.

VE THO
WEAK
DRY
ATTER
EIDLE
MINE
CTRIC
TROIT, MI

DON'T throw away those weak Batteries, they are good and worth money.

25 to 50 per cent. your Battery cost reduced or a like increase in mileage run by the use of an entirely new, but not an experimental device.

The "ECONOMY" Automobile Switch

It pays for itself on first installation. Guaranteed, Positive, Simple, Substantial, Ornamental. No short circuiting; no harm to coils. *Does the trick, besides has all the good features of other Switches.*

Garage and Repair concerns find the installation of these Switches a source of much profit.

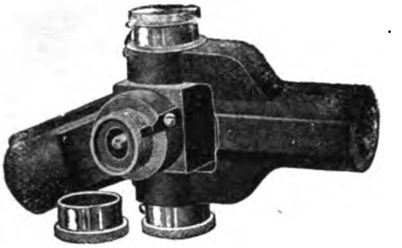
Sample by mail on receipt of price, $1.50. Discount to the trade. Money refunded if not satisfactory.

Automobile manufacturers are now adopting these switches. They make Dry Batteries the cheapest, simplest and most logical for ignition

Manufactured by **SEIDLER-MINER ELECTRIC COMPANY**
205 Jefferson Avenue **DETROIT, MICH.**

SEIDLER
MINER
OFF
1ST
2ND
3RD
LAST

UNIVERSAL JOINTS



DESIGNED FOR AUTOMOBILES AND MOTOR BOATS.

Taken apart or put together with the hands, no tools needed. Working bearings hardened steel and interchangeable, ⅞ in. diameter by 1⅛ in. long and so constructed it is impossible for dirt to get in or the grease to get out. Our circular shows you how this is done. One filling of Grease Cups lasts an ordinary season.

BLOOD BROS AUTOMOBILE & MACHINE CO.
Manufacturers
KALAMAZOO MICH.

1,000 TO 1,500 MILES

on one charge is a common performance for the Monitor Type No. 6 Storage battery on one and on two cylinder cars, such as the Olds, Reo, Autocar, Rambler, Cadillac, etc. It is absolutely reliable and of the highest grade. THE PRICE IS $9.00
Voltage 6
20 Capacity Ampere-Hours
Dimension 5 in. x 5½ in. x 7¾ in.

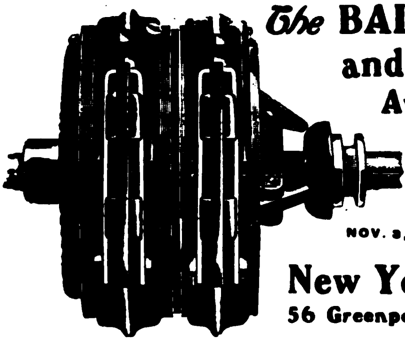
"AMERICAN"
STORAGE
BATTERY
MONITOR TYPE
NUMBER
MADE BY
AMERICAN BATTERY COMPANY
CHICAGO, ILL.

For four-cylinder automobiles and the larger touring cars, batteries of larger capacity are recommended.

Monitor, Type B 6, Voltage 6,
Capacity 45 Ampere-Hrs., Price, $15.00
Monitor, Type C 6, Voltage 6,
Capacity 60 Ampere-Hrs., Price, $18 00
Monitor, Type D 6, Voltage 6,
Capacity 75 Ampere-Hrs., Price, $21 00

Send for Catalogue. It tells why it pays to buy "AMERICAN" Storage Batteries.

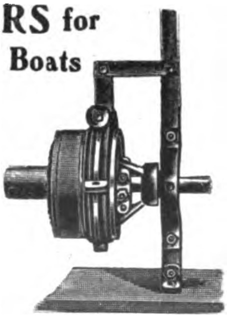
American Battery Company
172 AND 174 S. CLINTON ST., CHICAGO, ILL.
ESTABLISHED 1889



The BALL Improved TRANSMISSION and REVERSE GEARS for Automobiles and Motor Boats

MADE ONLY OF
SPUR GEARS

PATENTED APRIL 9, 1901;
NOV. 3, 1903; JAN. 12, 1904; FEB. 23, 1904



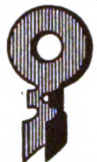
New York Gear Works
56 Greenpoint Ave, BROOKLYN, N. Y.
Western Agents J. H. NEUSTADT CO., St. Louis, Mo.

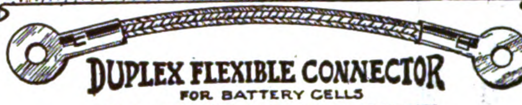
Satisfactory Crankshafts

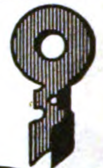
These are the kind we make, exclusively. We have been supplying them to the most exacting automobile and engine builders throughout the country for years. We make to order only, in any style, stroke, length or size up to four inches in diameter.

STANDARD CONNECTING ROD COMPANY Beaver Falls, Pa.

DUPLEX WIRE TERMINALS







DUPLEX FLEXIBLE CONNECTOR
FOR BATTERY CELLS
PREVENTS LOOSE WIRES AND SHORT CIRCUITS
SEND 50 CENTS FOR ASSORTED PACKAGE OF TERMINALS OR CONNECTORS
· RADIATORS BUILT TO ORDER ·

THE BLISS-CHESTER CO.
PROVIDENCE, R. I.

HANG IT

upside down, if you like, and you will find that it won't spill a drop.

Of course it's the "GEECEE" that does the trick; no other battery could.

The "GEECEE" was the ONLY storage battery used in the leading automobiles during the recent New York show.

Among others, who used the "GEECEE" in ALL their show and demonstration cars, we only mention:
Oldsmobile, Berkshire Automobile Co., York Automobile Co., etc.

Write for new 1906 Catalogue and Jobbers' Prices.
Manufacturers
ROYAL BATTERY CO., 143 Chambers St. NEW YORK
NATIONAL SALES CORPORATION
Factory Sales Managers 256 BROADWAY, NEW YORK

The Darracq Car, which made two miles in 58 4-5 s., was fitted with

NIEUPORT MAGNETO

We are the sole U. S. agents for **Nieuport Magneto Spark Plug Coil,** Commutator, B. G. S. Storage Battery, Ignition Wire. All electric supply for Automobiles.

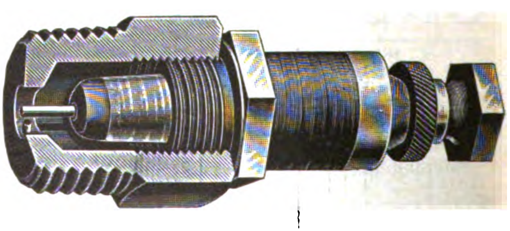
Albert Champion Company
541 TREMONT ST., BOSTON, MASS.

COMET

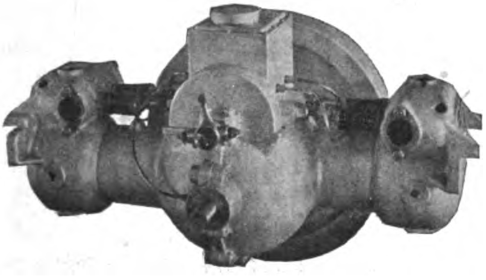
Is an indestructible **Mica Spark Plug.** The strongest made. **The Manufacturers Plug.** Best Insulation of any Spark Plug. Nothing to break. **Closed End and Open End. Price regular sizes, $1.50**

SOOTLESS

The Only Sootless Mica Spark Plug. New Invention. Only Sootless Plug that will not break in air cooled engines. Guaranteed six months Sootless. Regular sizes, $1.55 each.



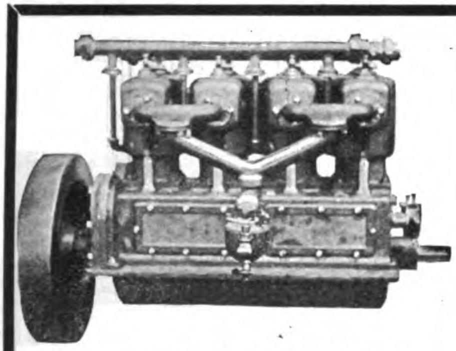
Manufactured by
THE OAKES & DOW CO.
40 SUDBURY ST., BOSTON, MASS.



JUST A GOOD MOTOR

with positive oiler. Absolutely no vibration. Sizes 4½ x 4 and 5 x 4½.

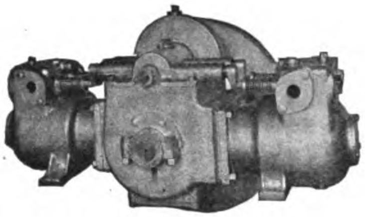
Davis Manufacturing Co.
Milwaukee, Wis.



4-Cylinder, 4-Cycle, 18-20 H. P.
" " 25-30 H. P.
1-Cylinder, 4-Cycle, 1½ and 3 H. P.
4-Cylinder, " 12 and 18 H. P.
18-20 H. P. are air or water cooled.

Before placing an order for Motors write us for price and descriptive matter. Automobile manufacturers who contemplate closing contracts for motors, write us.

Smith & Williams
COLUMBUS, OHIO

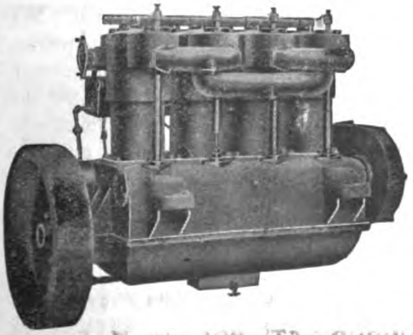


25 H. P. Vertical
16 H. P. Opposed

High Class Automobile

MOTORS

The A. Streit Machine Co. :: Cincinnati, Ohio

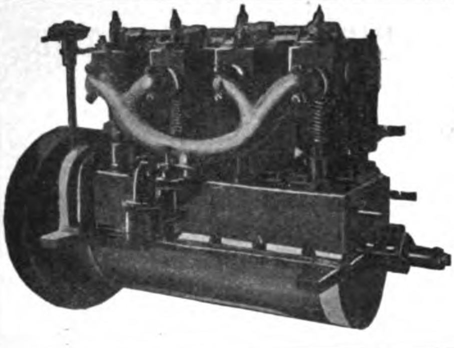


Automobile and Truck

MOTORS

16-18 H. P.
24-30 H. P.
45-55 H. P.

HERSCHELL-SPILLMAN CO.
W. Tonawanda, N. Y.



THE COLUMBUS

Motors have no superior. 4-cyl 24-30 h. p. for automobiles. 4-cyl. 12 to 18 h. p. for motor boats. 2-cyl. opposed 16-18 h. p. 4 h. p. marine.

Steering gears and full line of spark plugs, carburetors, coils, pumps and accessories at the right price.

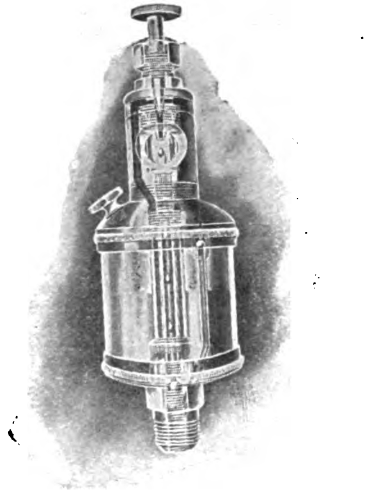
AGENTS WANTED

Write for catalogue.

COLUMBUS SCREW AND MACHINE COMPANY
COLUMBUS O.

The Buffalo Pressure Feed Cylinder Oiler

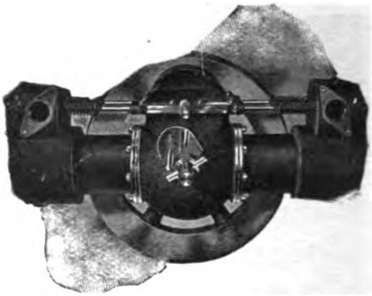
Fig. 50



Patent applied for

SHERWOOD MFG. CO., **BUFFALO, N. Y.**
Write for prices

THE POWER IS HIGH ∴ BUT THE PRICE IS LOW

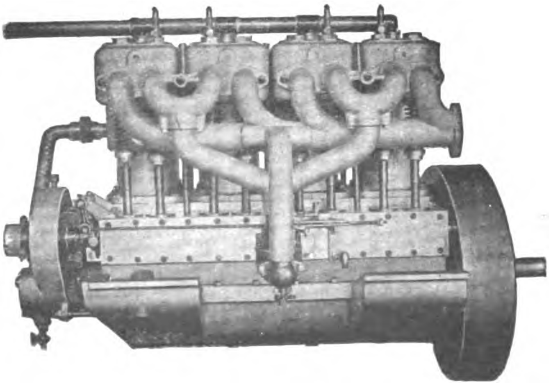


16 H. P. Double Opposed Cylinder

Bore and stroke 5x5″. Weight, including balance wheel, 300 lbs. Length 34″. Width 14″. Valves mechanically operated.

We have a good proposition—write for particulars.

THE BEILFUSS MOTOR CO.
LANSING - - MICH.



Before placing your orders for 1906, correspond with us. We can prove to you that prices, quality, and efficiency considered, our motors are the best for the purpose for which you may desire them. We build gasoline motors for racing cars, passenger busses, delivery trucks, grading locomotives, and launches from 12 to 180 H. P.

Milwaukee Auto Engine & Supply Co.
706 Winnebago Street **MILWAUKEE, WIS**

MILTON P. HIGGINS, President JOHN W. HIGGINS, Secretary and Gen. Manager GEORGE I. ALDEN, Treasurer

Worcester Pressed Steel Company

Successors to the WORCESTER FERRULE AND MFG. CO. Established 1883

Light and Heavy Metal Stamping, Cold Forgings

Ball-Bearings, Stove Trimmings and Sheet Metal Specialties
Automobile, Bicycle and Electrical Fittings

CHICAGO OFFICE, 1064 MONADNOCK BLOCK

MAIN OFFICE AND FACTORY **Worcester, Massachusetts.**

Cable Address, PRESTEEL
CODES A. B. C. Lieber's

THE HONESTLY BUILT "LEADER"

Model "C". Price $1,000.00

Engine (Leader) 4¼x4½", drive—Centre Chain, Wheels—30x3½", wheel base—84"; Transmission, Ball Planetary; Detachable Side Entrance Body; Equipment, 5 Lamps, Horn, Generator and Tools. Weight, 1580 lbs.

Model "D"

Same as above, except with larger engine, 5x4½", 20 H. P. Price, $1050.

Model "B"

Double opposed motor, 4¼"x4½", 28x3" wheels, price, $850.00. Write for complete details and agency proposition.

COLUMBIA ELECTRIC CO.

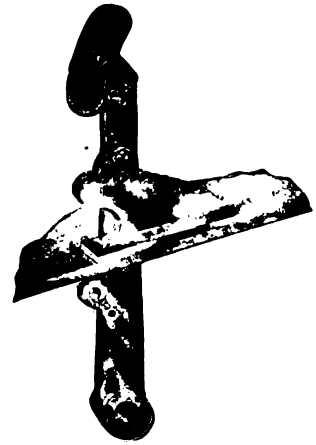
Main Office, 23 E. Ohio St., Indianapolis, Ind.
Factory, McCordsville, Ind.

Over 20,000 in Vse

This is pretty good evidence that the

VictorRatchetFootLever

is a device of great service to automobilists



It is easily operated, and never fails in locking the brake.

Carried in stock to fit all prominent makes. It can be put in place in a few minutes, without making any change in your car.

THE READING AUTOMOBILE CO.
28 SOUTH FIFTH STREET, READING, PENNA.

F. W. OFELDT & SONS

Nyack-on-the-Hudson (only) N. Y.

TOO BUSY TO EXHIBIT AT BOSTON SHOW

Blue Flame Kerosene Burner

Noted for its simplicity. Only 60 lbs. air pressure required. Costs one cent per mile for fuel. Increases speed of car 25 per cent. ADAPTED FOR ANY CAR.

Safety Water Tube Water Level Boiler

Cannot burn out

Gives Superheated Steam

Does not require a Gauge Glass

Saves Repair Bills and Towing

Has a reserve when a hill is reached.

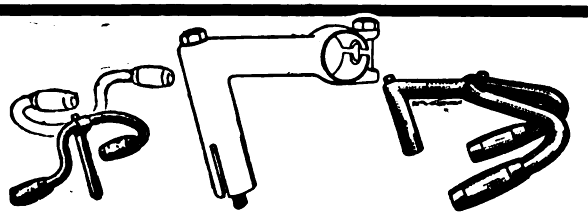
Built by Boiler Makers of 20 years experience.

Combines all the Strong Points of the Flash Type with those of the Water Level.

AUTOMATIC WATER REGULATOR

Operates—The By-pass automatically.

Does away with watching the Gauge Glass.



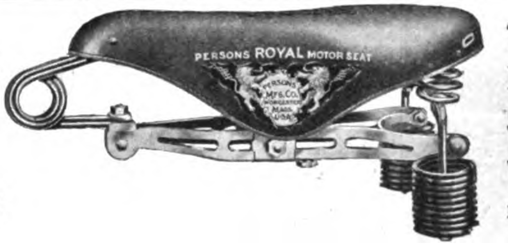
IDEAL HANDLE BARS and STEMS

to suit all classes of trade, in quality and price. Stems plated or machined. Bars bent in any shape in quantities. Get our prices and circular. Satisfaction guaranteed.

Sole Manufacturers, **IDEAL PLATING CO. 3 Appleton St. Boston, Mass., U.S.A**

PERSONS ROYAL MOTOR SEAT

ADDS LUXURY to MOTOR-CYCLING



The very best Motorcycle Saddle in the world, bar none.

Insist on Getting it when you place your order

The Persons Manufacturing Co. *Gentlemen:*—I owe you an apology for the delay in answering your letter of November 7. Regarding your Royal Motor Seat—I hardly know how to express my appreciation of it. During the few weeks that I have had it I have ridden something over 2,500 miles and have never known what it was to be tired or saddle sore. I have used about every saddle there is on the market, but for real comfort yours is by far superior to anything I have ever seen. It makes a motorcycle as easy as a rocking chair, and if motorcycle manufacturers know their business there will be no hesitancy on their part in adopting the Royal Motor Seat. I could sell a machine equipped with it that I would have difficulty in giving away with the ordinary saddle. Yours very truly, G. W. Sherman, Newark, N. J.

Persons Mfg. Co.—*Dear Sirs:*—We have been watching the wearing qualities of your Royal Motor Seat since you first introduced it, for the general appearance was pleasing, and we felt that we would be able to equip them on our 1906 models, providing they would give good service. I am pleased to state that I have just examined one of these saddles, which has been used 3,500 miles on one of our machines, and the rider informed me that he had not been obliged to repair a single part or make any adjustments. I think that this is a particularly good record, especially as these motorcycle saddles are subjected to a great deal harder usage than the ordinary bicycle seat. We will be pleased to talk with you on our 1906 requirements when you have the opportunity to call on us. Chas. H. Metz, Brockton, Mass.

Persons Manufacturing Co., - Worcester, Mass.

The Brown Yielding Gear

permits the use of DIRECT CHAIN DRIVE ON ANY MOTOR CYCLE. Self oiling, self centering; gives that smooth, non-jerking transmission. Only three working parts. Will not break the cheapest chain.

Every 1906 ARMAC MOTOR CYCLE is fitted with EITHER "Brown Gear" or Imported V Belt Transmission or BOTH transmissions with one machine.
Will add 100 per cent. to any chain drive machine. Catalog ready.

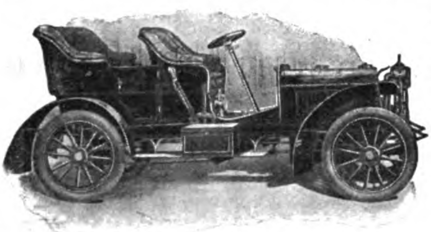
ARMAC MOTOR CO. 472 Carroll Ave CHICAGO, ILL.

ATTENTION Automobile Manufacturers!

We have perfected a new system for trimming and upholstering Automobiles, by which we can save you money.
Write us for particulars.

B. F. EVERITT, 63-65 Fort St., (East) Detroit, Mich.

LANE STEAM TOURING CARS

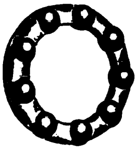


Steel Chassis, full aluminum body, compound engine and condenser. No heat under seats. All functions pertaining to power generation automatic.

A new type of boiler possessing the economy and progressive heating advantages of the flash, but carrying the constant pressure and having reserve of power common to boilers having a water level.

PRICE, $2250. Manufactured by

LANE MOTOR VEHICLE CO.
POUGHKEEPSIE NEW YORK
New York Representative,
W. G. RICHARDSON, 516-518 West 145th Street



THE SARTUS

Ball Retainer

(Brought Out in 1896)

The Original and the Best

This retainer is manufactured by the Sartus Ball Bearing Company, under U. S. Patents Nos. 576,500, 611,689 and 799,008, which cover all ball retainers having a single row of standards rising from the base and all other manufacturers of such ball retainers are infringers, and users of retainers made by them are warned against continuing such use.

Don't Buy a Law-Suit

THE SARTUS BALL BEARING CO.
155 Spring Street, NEW YORK CITY

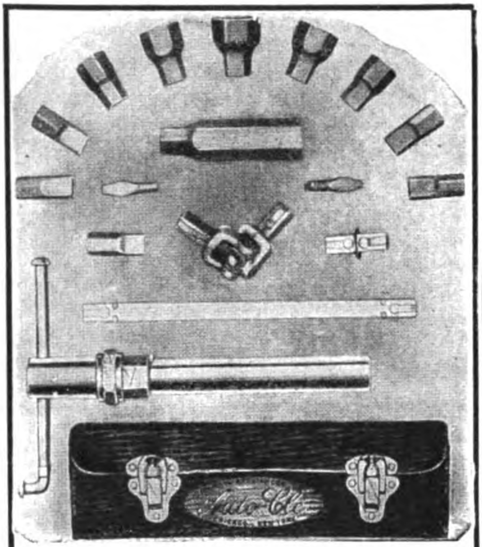
Automobile Bodios

Stylish, well-built, up-to-date in every respect. Thirty-six years of experience back of our product, and a capacity of 15,000 bodies annually.
Prompt deliveries sure.

Tops and Storm Fronts

that are what you are looking for. Durable, well-made.
Write for prices.

COLUMBUS BUGGY CO.
Columhus, Ohio U. S. A.



THE
AUTO-CLE WRENCH

Comprises all the above parts. Made in two sizes. Ask your dealer or write

Railway Appliances Co.
1160 Old Colony Bldg., Chicago

New Prices

Our new catalog lists everything that is new and good. We carry every article in Accessories that possesses merit. We always set the pace for low prices. Send 10c. for catalog "D." **FREE** to dealers.

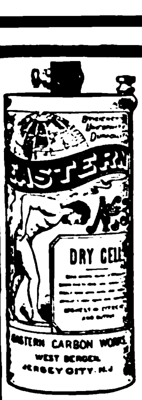
The Ball-Fintze Co.
Newark, Ohio.

Dunn SEMI-DRY CELL Records

Over 1400 miles S. S. "Uncle Sam" Tomoka River, Florida.
Over 1871 miles Gasoline Track Motor Car, Lake Shore & Michigan Southern Ry.
Season's service in Oldsmobile Runabout by Doctor running 10 to 15 miles daily.
Over 4000 miles extending into two seasons automobile use in Newark, N. J.

Send for "Sparks for Motor Ignition," a booklet of information, not an advertisement.

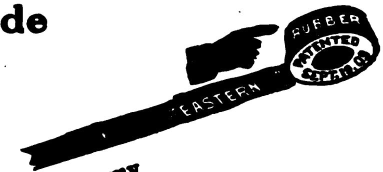
The Semi-Dry Battery Co., Sole Manufacturers, Newark, N. J.

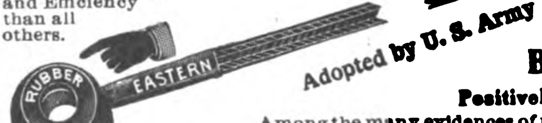


Electrotypes Ready

Eastern High Grade
IGNITION CELLS

fill the place for something better than that which has been produced. More Voltage, Amperage, Life and Efficiency than all others.





Adopted by U. S. Army

EASTERN
Battery Connector
Positively Won't Shake Loose.

Among the many evidences of merit and popularity we have an order of 100.000 from C. S. Knowles, Boston, Mass.

Eastern Carbon Works, Carbon Place, Jersey City, N. J.

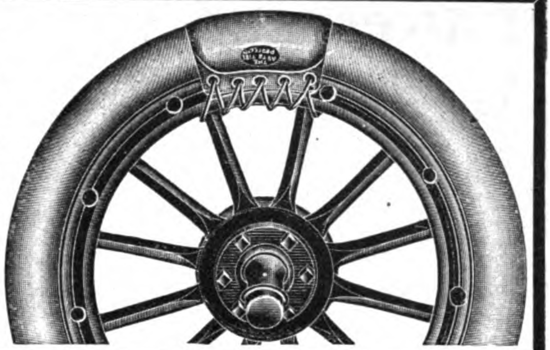
Be on the safe side and do not attempt any trip, long or short, without the

Rubber Auto Tire Protector

It is a protector that REALLY PROTECTS. It is not an unsightly, clumsy device, but being made of the best quality of rubber and duck, readily conforms to the shape of the tire, and is not noticeable when attached. It may be adjusted in less than five minutes.

For sale by all dealers, or

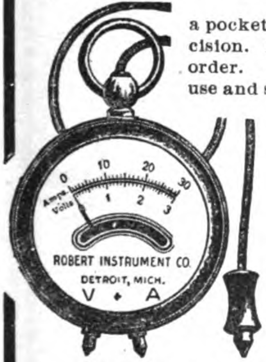
Empire Rubber Manufacturing Company
TRENTON, N. J.



DON'T WORRY

about your batteries. There is a certain way to test them and find out their condition at any time, in an instant. Use the

ROBERT VOLTAMMETER



a pocket instrument of precision. Does not get out of order. Always ready for use and shows

AT A GLANCE
THE STATE OF YOUR
BATTERIES

No failing on the road
No walking home
No towing home from weak batteries

If you have THE ROBERT and make good use of it.

PRICE, including Leather Case, $6.00

(0-8 VOLTS – 0-30 AMPERES)
(0-6 " – 0-30 ")
(0-10 " – 0-30 ")
(0-30 AMPERES)

WRITE FOR CIRCULAR AND DISCOUNTS

ROBERT INSTRUMENT CO.
54 Shelby St. DETROIT, MICH

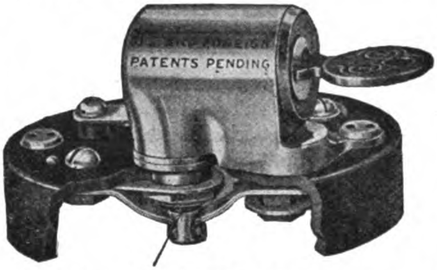
AUTOMOBILE STOLEN

This headline appears frequently in the newspapers

"The Auto-Lock-Plug"

makes theft impossible.

When you hold the key, the car remains in the garage.



Above cut shows "THE AUTO-LOCK-PLUG" mounted on a Splitdorf switch.

Takes the place of the commonplace cut-out plug. Operates by Yale Lock and Key. Three keys with each lock. Each lock requires a different key. Dust proof, grease proof and theft proof.

Simply Perfect Perfectly Simple

Lock plugs to fit any form of **Splitdorf switch or coil** ready for immediate delivery. Lock plugs for other switches and coils made to order in quantities. **Price, $5.00.**

AUTO-LOCK-PLUG CO.
31 NASSAU STREET NEW YORK CITY

DODGE POSITIVE FORCE FEED OILERS

For Automobiles, Stationary and Marine Engines

Absolutely automatic, require no attention. They are not eye-servants, but can be absolutely relied upon in all weather and under all conditions. The greater the speed, the more oil is delivered to the parts, and when you stop, the flow of oil stops. No valves to open, no valves to close, **no blue smoke**, consequently no waste of oil.

Manufactured by the

Dodge Lubricator Company
36 Columbus Avenue, Boston, Mass.
National Sales Corporation, 256 Broadway, New York, N. Y.
Factory Sales Managers

Overhead Vehicle Washers

PATENTED MAY 2, 1898

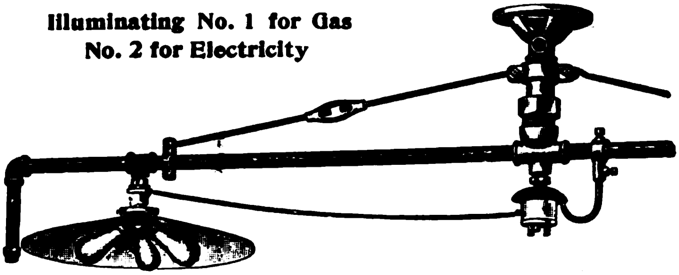
This cut is from a Photograph of our latest improved Superior No. 2, and illustrates the heavy and substantial construction of the head which is of cast brass.

This is the only ILLUMINATED WASHER on the market. Users of this machine are enthusiastic in its praise. Allows of washing at night or in a dark place, throwing the light where it is needed. Safe, simple, reliable.

PLAIN WASHERS ALSO

Send for catalogue.

Illuminating No. 1 for Gas
No. 2 for Electricity

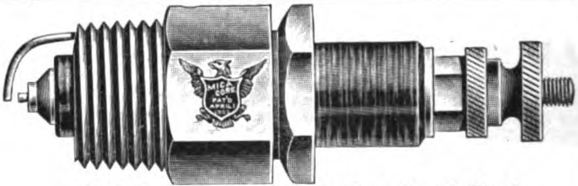


VEHICLE SPECIALTY CO., Inc., 26 State Street, Hartford, Conn.

AMERICAN

1906 COILS, PLUGS, TIMERS, ETC.

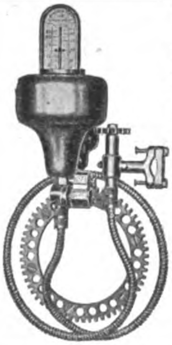
will remedy your ignition troubles



1906 American Indestructible Spark Plug

Recognized the world over for its superior qualities. It is practically Soot Proof and lasts indefinitely. For Efficiency and Durability our 1906 line of Coils have no equal. They are fitted with an extremely fast vibrator and embody a special form of insulation, which cannot be punctured under any conditions. We make all styles including the **UNIT DASH TYPE**. You should also investigate our new 1906 Timer and other ignition specialties. Write for catalog.

American Coil Co., Foxboro, Mass.



The Speedometer of the Season of 1906 "The Springfield," The hit of the New York and Chicago Show

This cut shows the instrument and all its fittings. It attaches to the dashboard by a jointed bracket, is driven by the gear shown, from either front wheel, by means of a double-jacketed flexible shaft, the pinion bracket of which is universal and will fit to the steering knuckle arm of any American built car.

This instrument will tell HOW FAST you are going, HOW FAR on each trip and HOW MANY MILES your car goes the whole season.

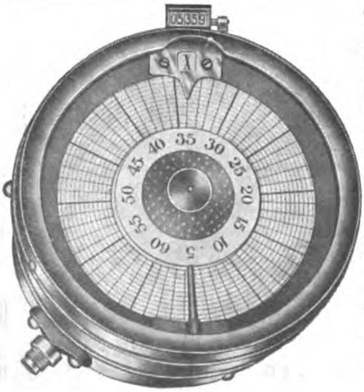
Its Dial is Self-Luminous and can be read after dark. Its accuracy at every mile is guaranteed. It is designed and constructed for long service. Balanced motions, Hardened Steel Parts, Self-Lubricating throughout, water and dust proof, at twice the price it could be no better. All material and workmanship are the best. It is sold at only a fair margin of profit. Price for any sized wheel with complete fittings:

50 Mile Combination Instrument	$45.00	50 Mile without Odometer	$35.00
80 Mile Combination Instrument	55.00	80 Mile without Odometer	45.00

Patented in United States October 10, 1905. Patented in Canada, England and Europe. Other patents pending.

Established 1865. MANUFACTURED BY Incorporated 1883.

THE R. H. SMITH MFG. CO., Springfield, Mass.



Time indicated 34 minutes past 10 o'clock

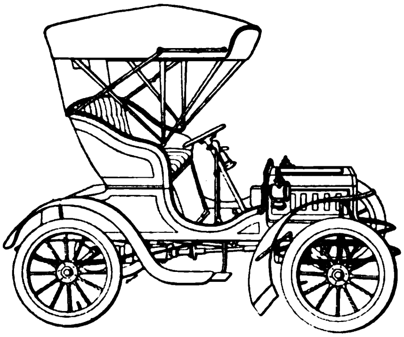
Bullard's Speed-Recorder

It is the only instrument that will accurately record on a removable card any speed from one mile per hour to that of Ormond beach without changing its mechanism. A No. 40 thread, over a 1-inch pulley, will operate it.

J. H. BULLARD,
Winchester Park, - - Springfield, Mass.

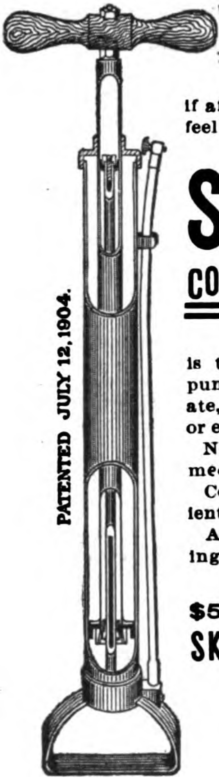
The COVERT CHAINLESS

A powerful Runabout for city or country.



It has made many wonderful touring records during the past several seasons, and our 1906 model has been greatly improved, so that we now have a strictly perfect and reliable car, that is sure to give satisfaction for several seasons. Upright motor in front sliding gear, ball bearing transmission, shaft drive, and all mechanism carefully protected from dust and dirt-price, F. O. B. Lockport, $650.00. Prompt deliveries. Write for catalog.

Covert Motor Vehicle Co.
Richmond Ave., Lockport, N. Y.


PATENTED JULY 12, 1904.

Your $5.00 Back

If after 30 days' trial you don't feel absolutely sure the

SKINNER
COMPOUND AIR PUMP

is the best automobile tire pump, and the easiest to operate, that you have ever tried or ever seen.

No wires, gears or complex mechanism to get out of order.

Compact, light and convenient for carrying.

A Labor Saving, Time Saving, Satisfaction Giving Pump.

$5 EXPRESS PREPAID

SKINNER & SKINNER
Mfrs.

4133 INDIANA AVE
CHICAGO

"Give me the Imperial-Wixon"

This is the call that dealers hear every day, because every

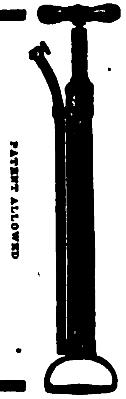
IMPERIAL-WIXON COMPOUND AIR PUMP

sold is an advertisement that sells others. It's invariably so satisfactory that its possessor voices his satisfaction and the good news gets about.

To prove that it will satisfy you, we sell it for **$5 on Approval.**

Small, compact. Easy to work, quick to give results. The most air with the least exertion—that's the Imperial-Wixon.

Ask any dealer and write us now for circular describing this and other high-class automobile accessories.



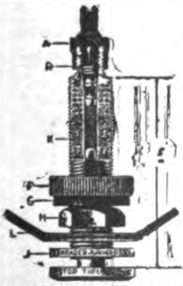
Imperial Brass Mfg. Co. 242 So. Jefferson St., CHICAGO, Ill.

Motor Car Equipment Co., 55 Warren St., New York, Sole Export Agents.

Schrader Universal Valves

Trade-mark Registered April 30, 1895.

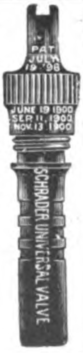
Simple and Absolutely Air Tight



Schrader Motor Tire Valves as shown in cut, are the regular equipment for G & J style Motor Tires, Hartford Dunlop Motor Tires, Fisk Detachable Motor Tires and New Goodyear Detachable Motor Tires. Our No. 777 Motor Tire Valve is the standard for 2½" and 3" tires, and our No. 725 Motor Tire Valve is the standard for tires larger than 3."

Schrader Universal Valves as shown in cut, and in different modifications are used on all Bicycle tires made in this country.

[Half size] These Valves are supplied to the Trade by all Tire Manufacturers. Valve Parts can be obtained from the Tire Makers or from the Manufacturer.



A. SCHRADER'S SON, Inc., *28-30-32 ROSE ST., NEW YORK CITY* [Full size]

AUTOCHIME PAT'D

DO YOU KNOW WHY

THE

AUTOCHIME

is meeting with such a success?

BECAUSE it gives such a beautiful rich chime.
It is small and compact with no soldered parts.
It has no pockets to collect dirt or soot.
It will positively not clog up and get out of order.

DEALERS, GET WISE. PRICE $15.00 INCLUDING VALVE AND FOOT PEDAL.

GRAY-HAWLEY MFG. CO., 605-609 Fort Street, West, Detroit, Mich.

OLD TIRES MADE NEW

NEW TIRES MADE PUNCTURE PROOF

THE NEWMASTIC FILLING

For Clincher and Single Tube Tires
Just as Resilient as a Pneumatic
Just as Safe as a Solid Tire

HOW DO WE DO IT?

Write Us and Learn

NEWMASTIC TIRE CO.

ST. LOUIS CHICAGO
LOS ANGELES

MOSSBERG ELECTRIC CHIME No. 12
MOSSBERG PATD

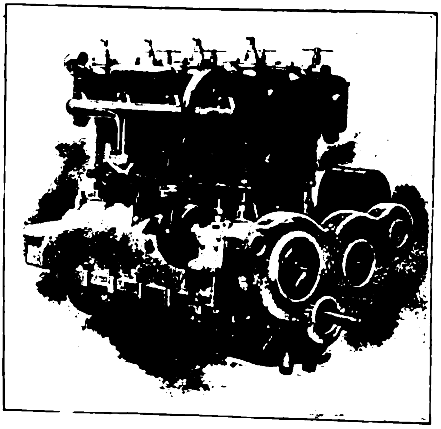
We make a very extensive line of bicycle and auto bells, all of which give practical illustrations of "sound" construction, and which, by their variety and peculiar sweetness of tone, never fail to gain the interested ears of those who hear them.

All about the Mossberg Bells in our catalogue, which is yours for the asking.

FRANK MOSSBERG CO.

Attleboro, Mass., U. S. A.

Foreign Agents
S. GUITERMAN & CO, Ltd., London, England



ASTER MOTORS

Societe Anonyme L'Aster, Paris, France
American Branch:

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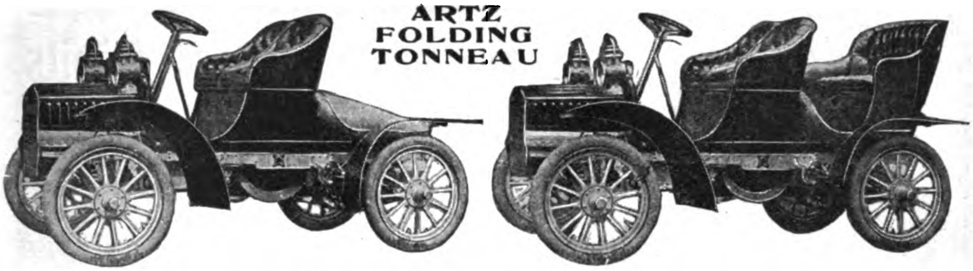
NEW YORK

Powerful, Reliable, Economical, Light Weight
French Motors for Automobiles,
10 to 60 H. P.

Send for Catalogues of French Motors, Chassis, Tires, Magnetos, Ignition Wire, Accessories, Etc.

ARTZ FOLDING TONNEAU

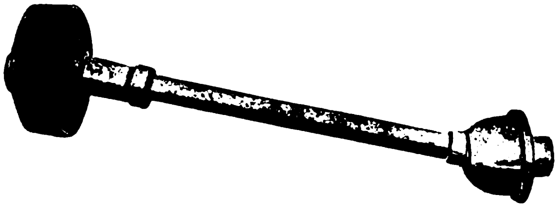


With Folding Tonneau Closed. With Folding Tonneau Open.

The above shows one and the same car fitted with the ARTZ FOLDING TONNEAU. Can be opened or closed in ten seconds: no part detached, strong, comfortable, noiseless, keeps clean when closed and adds only 70 pounds to the car. In writing give make and model of car you want it for. Price $100, painted and upholstered to match your car.

Dayton Folding Tonneau Co., 1143 N. Main St., Dayton, Ohio.

SPICER UNIVERSAL JOINTS



Absolutely oil-tight and dust-proof. In every way the best joints on the market.

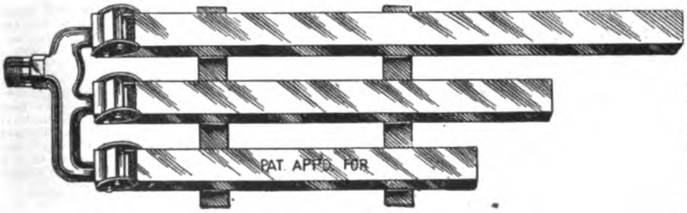
We have 51 different models and sizes, so that you are sure of securing what your conditions require.

Send for Catalog.

SPICER UNIVERSAL JOINT MFG. CO., **Plainfield, N. J.**

K. Franklin Peterson, 166 Lake St., Chicago. Thos. J. Wetzel, 11 Warren St.. New York.

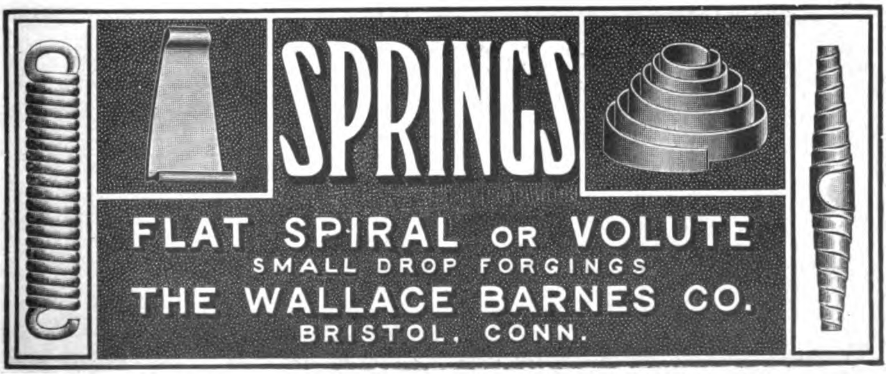
THE ORPHEUS CHIME. A Melodious Request for a Clear Road.



The **ORPHEUS** is absolutely the handsomest, strongest, and most, simply constructed chime on the market. It has the fewest parts, and is so made that there is nothing to get out of order. Can be attached to any steam or gasoline automobile, and by using the bellows, which we supply, it can be attached to any electric automobile.

The ORPHAUS CHIME has no inserted reeds to get loose or blow out, and will stand excessive heat, because there is no solder used in its construction. It is a polite warning that all will heed. Write for catalog.

THE CENTRAL GARAGE, Indianapolis, Ind.



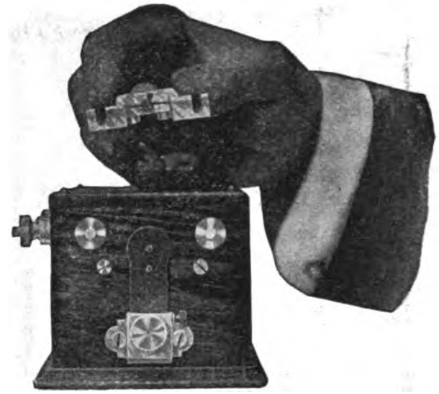
SPRINGS

FLAT SPIRAL OR VOLUTE

SMALL DROP FORGINGS

THE WALLACE BARNES CO.

BRISTOL, CONN.



Williams' Spark Coils

The best that brains or experience can build, or money can buy

The 1906 models are exceptionally economical in battery consumption and have many new and meritorious features. Insist on having the **Williams' Spark Coil** in your car. It will never disappoint you.

Send for booklet giving full information as to sizes and styles

E. Q. WILLLIAMS

539 S. Clinton St. Syracuse, N. Y.

WALLWORK'S

New Patent 1906 Diamond Pattern

NON-SKIDDING AND RE-TREADING COVER

FOR MOTOR TIRES

Better and cheaper than having tires re-covered. Any person can put on or take off in a few minutes. Cannot come off on the road.

Thousands in Use in Europe.

To fit any size clincher tire or wheel

Made from the best Chrome Leather and Metal. It is Puncture Proof.

Very little dust caused, as no vacuum is ormed under tread. No car should go out without several of our Patent Covers in case of accidents. An old worn-out tire is made equal to new when our Patent Cover is put on. The resilience is not affected in any way.

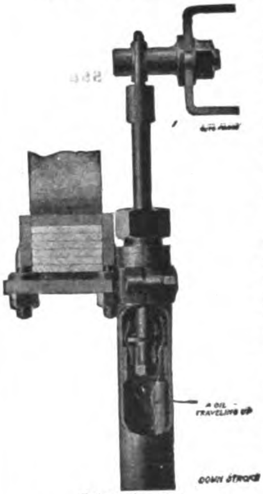
The Wells Light Manufacturing Co.

44 and 46 Washington St., New York

PROGRESSIVE AND UP-TO-DATE AUTOMOBILISTS

Protect themselves from Jars and their Springs from breakage by using

FOSTER SHOCK-BRAKES



Patent Pending.

They are a new and unique device for relieving the strain on the Springs of Automobiles, regardless of any bump or sudden shock which the wheels may encounter.

They are a small light cylinder, made of cold drawn steel, with piston or plunger which is attached to the frame and which operates as follows: The lower portion of the cylinder contains oil The sudden compression of the spring forces the plunger down against the oil, and the plunger head is so constructed that when it comes in contact with the oil in the lower part of the cylinder, it forces it through 8 small holes in the valve disc into the upper chamber, then when the recoil occurs, the oil acts as a cushion and the plunger returns with a slow, steady pull, which prevents the jar and shock always occasioned by a sudden bump. The oil flows back into the lower chamber, a small portion at a time, and thus relieves all strain and jar from the spring as well as eliminating all possibility of a broken spring.

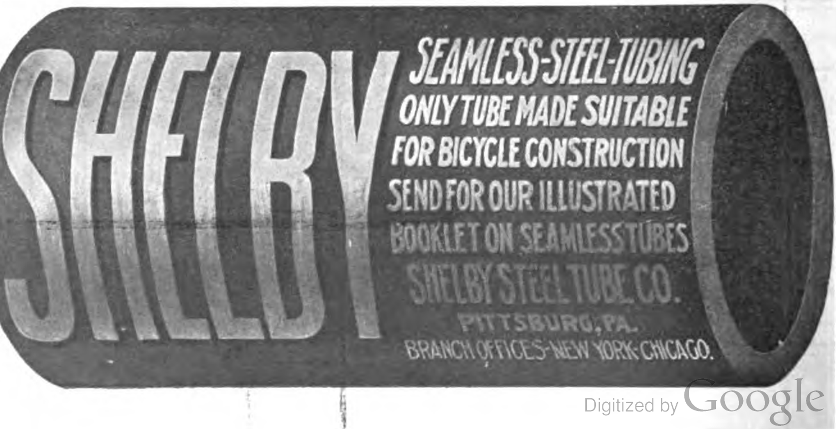
The FOSTER BRAKE is economical, simple, compact, substantial, weighing 2½ lbs., adjustable in every direction and can be placed on any machine.

Set of 2, $15.00 Set of 4, $30.00

Manufactured by

Gabriel Horn Mfg. Co.

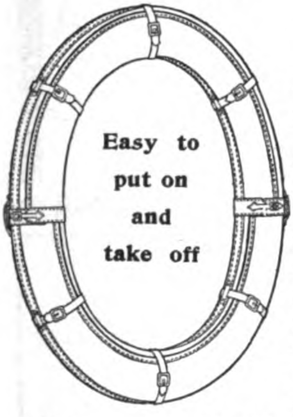
977 Hamilton St., Cleveland, Ohio.



NATHAN'S

FABRIC SUPPLIES FOR AUTOS

Patent Tire Cases


Easy to put on and take off

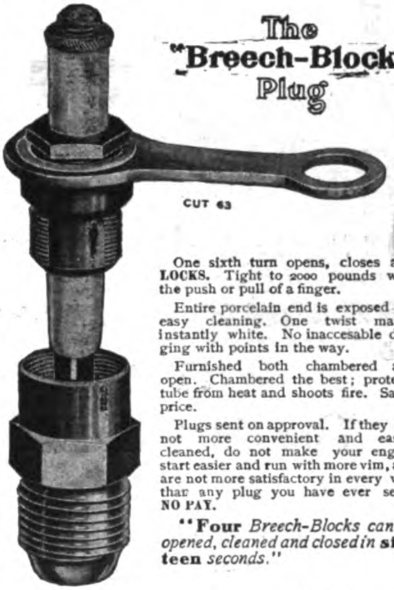
Also Storm Aprons, Auto Rain and Dust Aprons, Inner Tube Bags, Steering Joint Protectors, Sleeve Protectors. All Style Lamp Covers. New style feather-weight waterproof Over Boots for men and women, and other necessaries.

Send for Illustrated Price List.

Nathan Novelty Mfg. Co.

89 Reade Street, N. Y.

The "Breech-Block" Plug



One sixth turn opens, closes and **LOCKS.** Tight to 2000 pounds with the push or pull of a finger.

Entire porcelain end is exposed for easy cleaning. One twist makes instantly white. No inaccesable digging with points in the way.

Furnished both chambered and open. Chambered the best; protects tube from heat and shoots fire. Same price.

Plugs sent on approval. If they are not more convenient and easier cleaned, do not make your engine start easier and run with more vim, and are not more satisfactory in every way than any plug you have ever seen, **NO PAY.**

"Four *Breech-Blocks can be opened, cleaned and closed in* **sixteen** *seconds."*

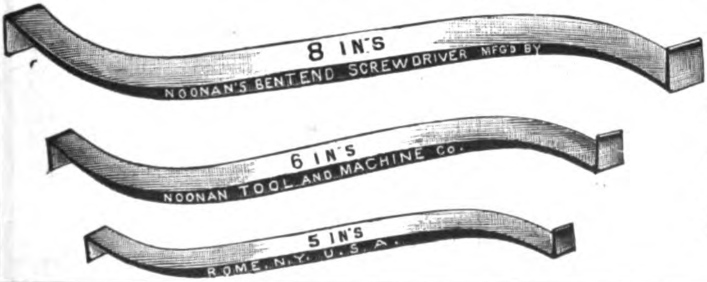
7 patents pending U. S. and Europe

Postpaid: $2.50

BOOKLET!

EARL CANEDY
2002 West Avenue, Chicago Heights
Illinois

Noonan's Bent End Screw Driver


8 IN'S
NOONAN'S BENT END SCREWDRIVER MFG'D BY
6 IN'S
NOONAN TOOL AND MACHINE CO.
5 IN'S
ROME, N.Y. U.S.A.

Made in 3 sizes; 50 cents each. This tool is made to get at screws where a straight tool cannot be got at.

We make 57 other tools and specialties.

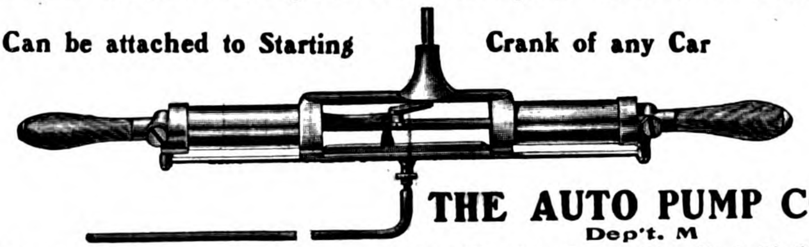
Let us send you catalogue.

Noonan Tool and Machine Works,
Rome, N. Y. U. S. A.

The Motor Will Inflate Your Tires

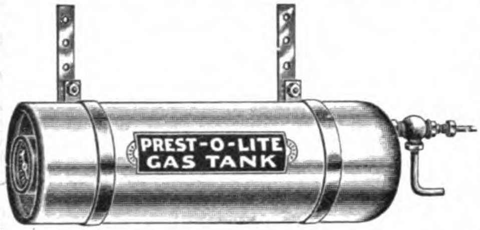
By Using THE SPENCER GIANT AIR PUMP

Can be attached to Starting Crank of any Car



THE AUTO PUMP CO.
Dep't. M
Springville, Erie County, New York, U. S. A.

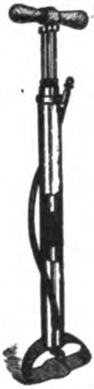
Send for Circular



$35.00 DOWN and $3.00 PER MONTH

It's the right price for the tank and a good light on your automobile. Some people burn a tank of gas in three weeks and others use only one tank in three months. More than 7000 in use and we have in our files a string of unsolicited testimonial letters from one-third of these buyers.
If you want to know more about our gas tank, write us for catalog, apply to any good dealer, or stop the first car you see with a TANK ON and ask the man.
Exclusive agencies being closed with good dealers.

THE PREST-O-LITE CO., **INDIANAPOLIS, IND.**



WHY NOT HAVE THE BEST?

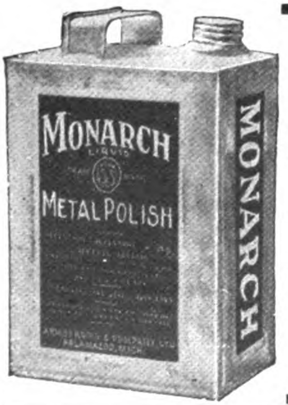
The New Wixon Compound Air Pump

OUR OFFER

To anyone sending us the price of this pump, $3.50, we will ship sample (not prepaid) on 10 days' trial. IF not satisfied that it is the best at any price it can be returned and money refunded.

H. H. WIXON & CO.

3514 S. California Ave., **CHICAGO.**



"DON'T SCRATCH"

YOUR AUTO TRIMMINGS AND LAMP REFLECTORS BY USING CHEAP POLISHES

Monarch Brand Metal Polishes

are absolutely free from all Acids and Grit, and are made to fill the requirements for cleaning and polishing the metallic trimmings of Automobiles

Easy — *Quick* — *High Lustre* — *Lasting Brilliancy*

Write us for testimonials from prominent Automobile Manufacturers, Dealers and Individual owners everywhere.

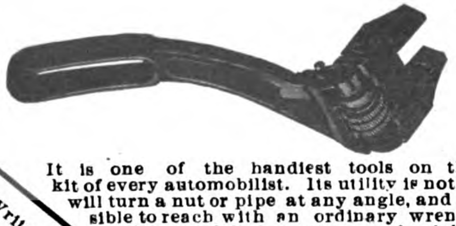
Warranted to give entire satisfaction. Samples upon request.

Manufactured only by . . . **ARMSTRONG & COMPANY**

Factory and General Offices, - - **KALAMAZOO, MICH.**

Special Quotations to Dealers

This is the only Metal Polish on the market made exclusively for Automobiles



The Ellis Wrench

Can be used as

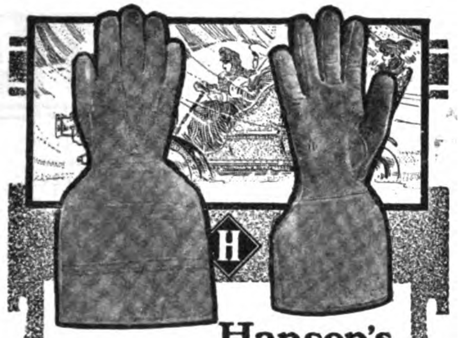
Straight Adjustable "S" Wrench
Offset Adjustable "S" Wrench
Straight Adjustable Pipe Wrench
Offset Adjustable Pipe Wrench

It is one of the handiest tools on the market and should be in the repair kit of every automobilist. Its utility is not limited to any particular kind of work. It will turn a nut or pipe at any angle, and permits getting at places it would be impossible to reach with an ordinary wrench. The hinged arrangement permits the swinging of the jaws at an angle, right or left. Made in four sizes.

Write for Catalogue

Patterson, Gottfried & Hunter, Limited,

Machinery, Metals, Hardware, Tools and Supplies,
146-150 CENTRE ST., Cor. Walker, New York City.



Hansen's Auto Gauntlets

Can be had with or without warm wool linings, with wide or extra wide cuffs to cover largest overcoat sleeve. Four styles in black or brown horsehide of our special tannage—always soft and flexible in spite of continued exposure to elements. Wash clean without drying hard. Perfect fit and pliability permit most delicate adjustments without removal. Sent direct if not at your dealers. Write for descriptive circular.

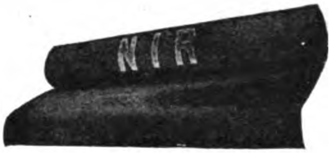
O. C. Hansen Mfg. Co.
360 East Water St., Milwaukee

"Built Like a Hand"

The "N. I. R." Rubber Treated Fabrics

—FOR—

Automobile Topping



IMPERVIOUS TO WATER —— COMPLETE PROTECTION

Woven Whipcord with Woven Whipcord Lining
Woven Whipcord with Tan Drill Lining
Printed Whipcord with Tan Drill Lining
Printed Whipcord with Printed Whipcord Lining
Tan Jean with Tan Jean Lining
Tan Drill with Tan Drill Lining

Sold by piece only in following widths:

Woven and Printed Whipcord and Tan Drill 50 in
Tan Jean 36 in. and 54 in.

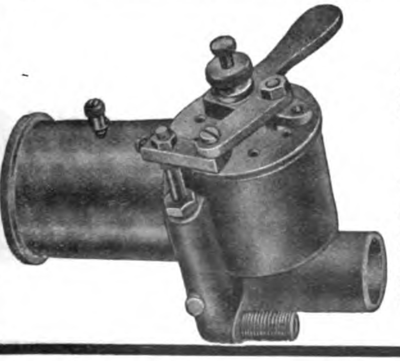
Our other specialties are:

"N. I. R." Automobile Shirt
"N. I. R." Collapsible Automobile Pail
"N. I. R." Emergency Repair Tape

Our Trade-Mark "N. I. R." on everything.

NATIONAL INDIA RUBBER CO.,
BRISTOL, R. I.

SELLING AGENCIES, 43-45 Pearl St., Buffalo, N. Y.
84 Lake St. Chicago. Ill. 409 W. Lombard St.,
Baltimore, Md.



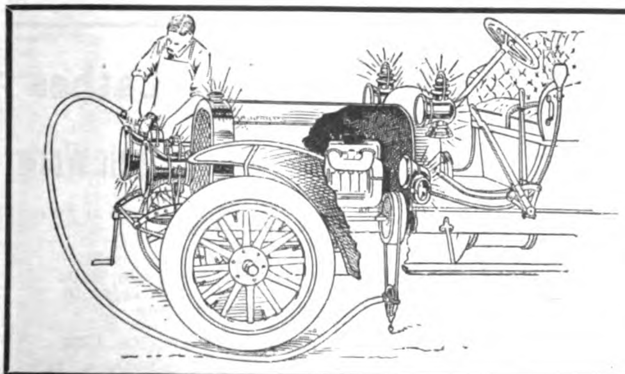
Young's Rotary Carburetor

will run an air cooled engine 25 per cent. cooler than any other known device.

Speed, Power, Economy

We guarantee an increase of speed and power with greater economy. Our guarantee is positive. You run no risk. If not as represented, your money refunded. Write to-day for descriptive booklet and prices.

CULVER NOVELTY CO., Culver Ind., U. S. A.



Every Piece of Brass

A MIRROR

Cheap too

Send for Catalog 160

GOATES CLIPPER MFG. CO.,
Worcester, Mass., U. S. A.

Purchase Your Spring Supply of

Automobile SUNDRIES

from us, if you want the best quality at a fair price. We have all the latest novelties, as well as a complete line of standard accessories. We want your order, because we know it will result in your becoming a regular customer.

MANUFACTURERS SUPPLIES COMPANY

418 Arch St., Philadelphia, Pa.

BARGAIN

...FOR SPOT CASH...

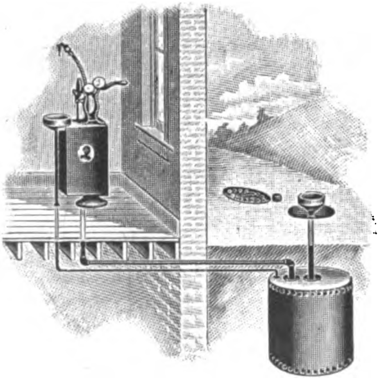
Automobile Tires, 28x3,
$8.50 each
Automobile Gas Lamps,
Nickeled,
$2.40 each
Automobile Baskets, all sizes,
$5.00 to $8.50
Bicycle Tires,
$1.25 $1.35 $1.65 pair

1906 Catalogue now ready.

William Wooster
10 Barclay Street, New York

Gasoline Storage System

Not Talk But Facts



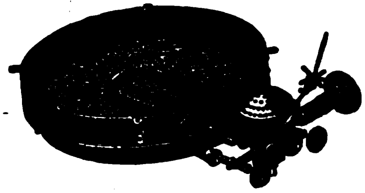
It measures accurately and registers the number of gallons pumped during a stated period. All of the fittings are full nickeled. The pump can be placed in the building at any convenient point and the tank buried in the ground outside of the building.

A Postal to us and we will be glad to tell you all about it.

MANUFACTURED BY

The Boyer-Radford & Gordon Tank & Pump Co.

Dayton, Ohio, U. S. A.



THE FORG GASOLINE BURNERS are the best and most reliable burners manufactured.

Burners for 14, 16 and 18-inch boilers are single compartment burners.

Burners for 20-inch boilers and larger are made with three compartments with a separate mixing tube for each. Write for catalogue.

PETER FORG, Somerville, Mass.

Also manufacturer of sprocket wheels to fit all standard chains

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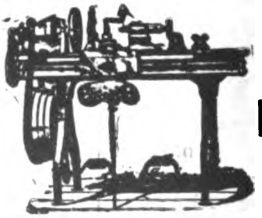

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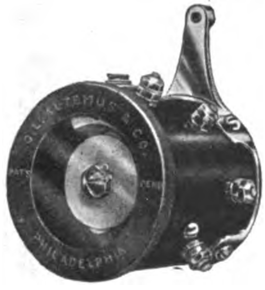

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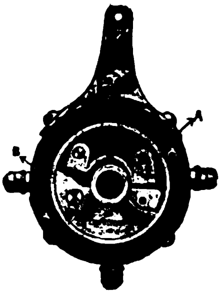
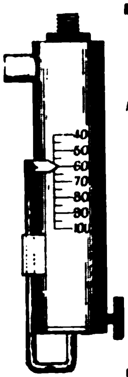


"IDEAL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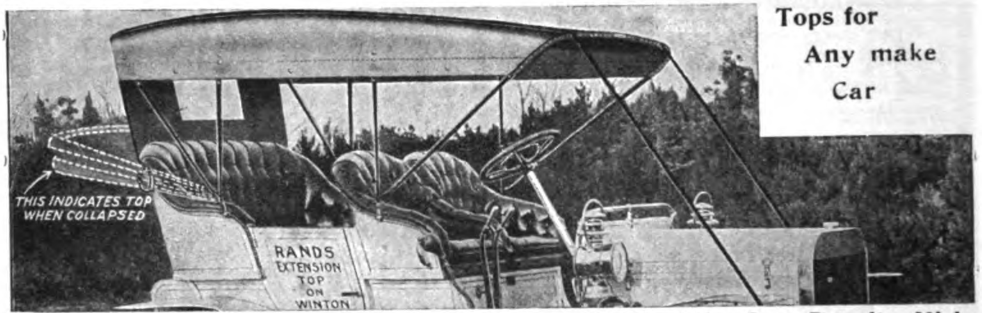
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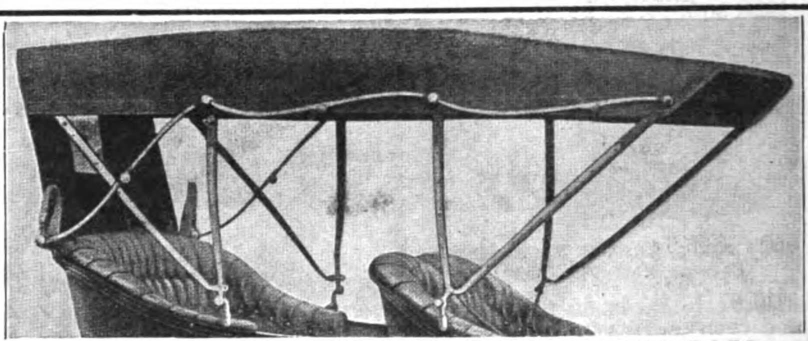

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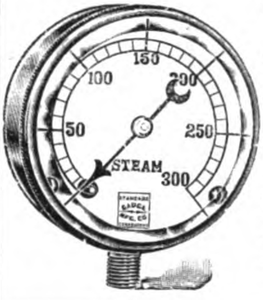

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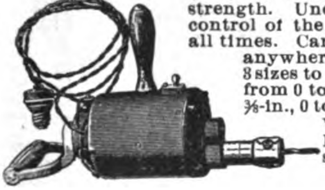

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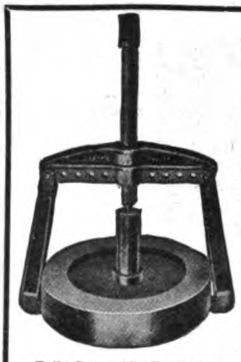

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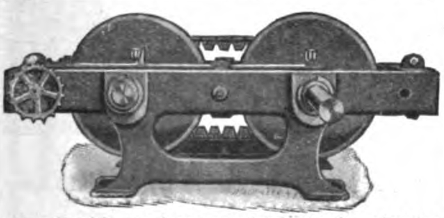

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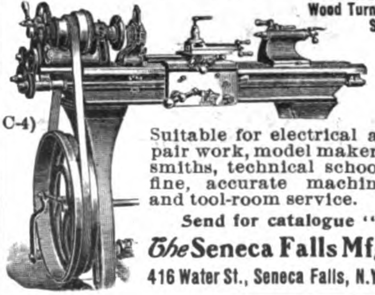

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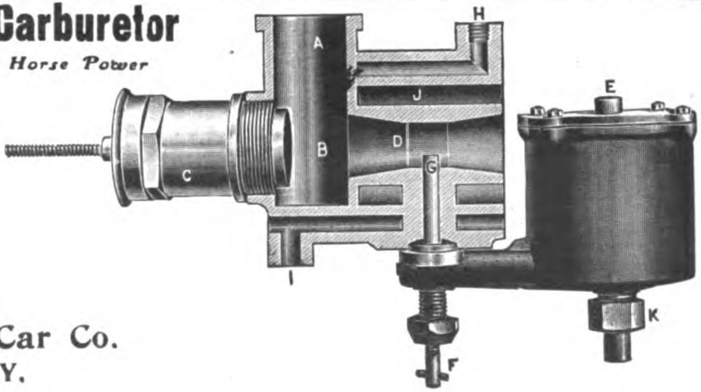

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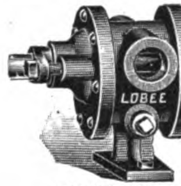

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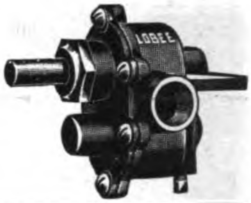

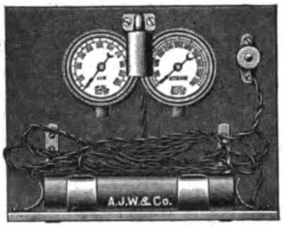

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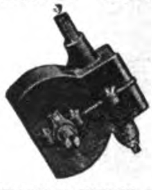

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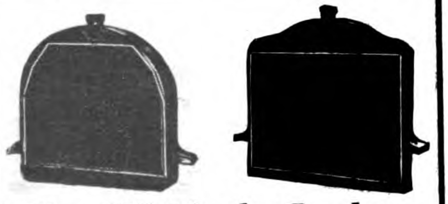

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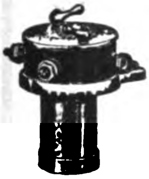

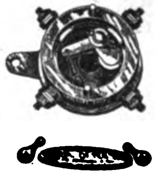

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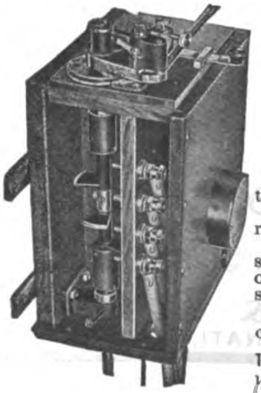

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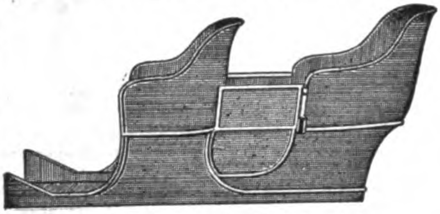

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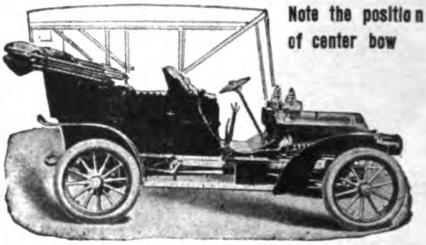

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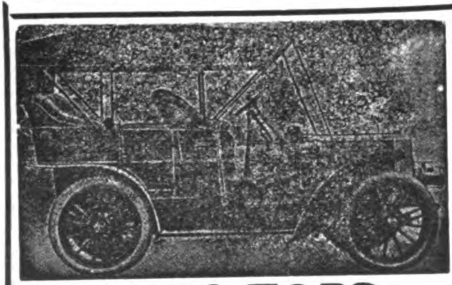

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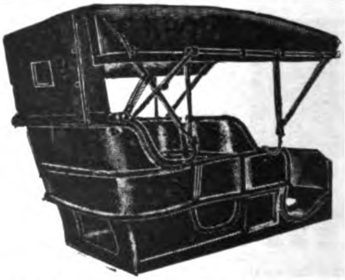

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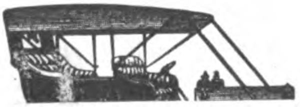

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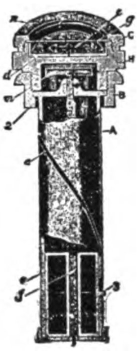

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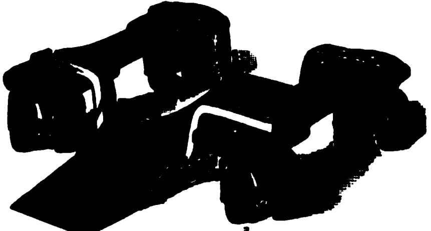

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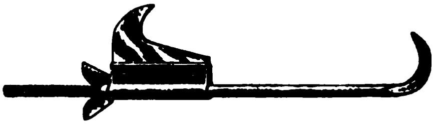

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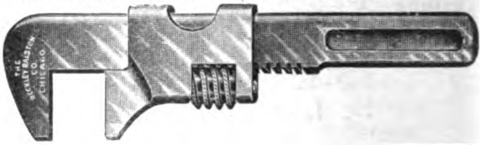
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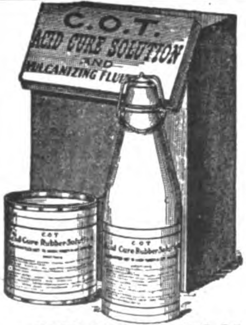
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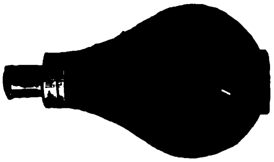

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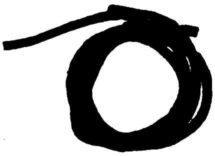
every size for flexible shafting.



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Made after an accepted design, best material only being used Our special design spokes, not only gives more strength but a natty appearance. Let us have an opportunity of figuring on your requirements.

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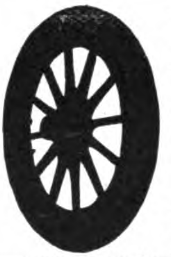

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Write us to-day for quotations on this WHEEL, or on Steel Wire Wheels which are our specialty. Artillery Wheels, Steering Knuckles, Steel Wire Wheels, Special Screw Machine Work, etc., a great specialty of ours. Inquiries gladly and promptly cared for. Let us hear from you at once.

We have a corps of the best workmen, best possible shipping facilities, hence orders promptly turned out.

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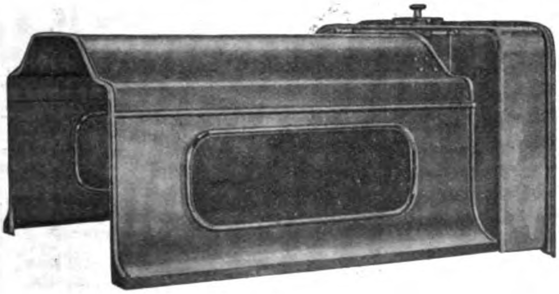

IN GERMAN SILVER, BRASS, COPPER, ALUMINUM or STEEL

COPPER PIPE CONNECTIONS

FIRE EXTINGUISHERS FOR GARAGE AND AUTOMOBILE

"IMITATION RADIATORS FOR AIR-COOLED MOTORS."

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To Play Turn Bottom Up
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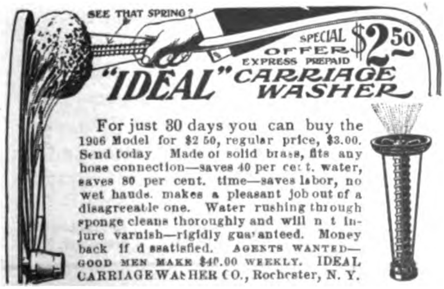
Established 1841
63-73 Pitts Street, Boston, Mass, U. S. A.

This offer extended for 30 days longer



For just 30 days you can buy the 1906 Model for $2 50, regular price, $3.00. Send today Made of solid brass, fits any hose connection—saves 40 per cent. water, saves 80 per cent. time—saves labor, no wet hands. makes a pleasant job out of a disagreeable one. Water rushing through sponge cleans thoroughly and will not injure varnish—rigidly guaranteed. Money back if dissatisfied. AGENTS WANTED—GOOD MEN MAKE $40.00 WEEKLY. IDEAL CARRIAGE WASHER CO., Rochester, N. Y.

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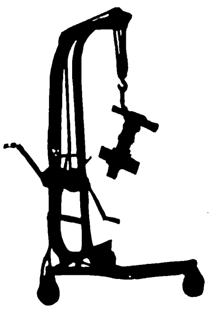

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TIRES SOLD AND REPAIRED REASONABLE

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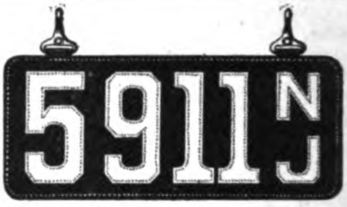

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We are headquarters for water-proof materials of all kinds and make a specialty of materials used in the manufacture of Auto Tops, Storm Curtains, Slip Covers, etc.

Write for samples and price list.

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The kind that won't stretch, and that wear well. Something better, and something new.

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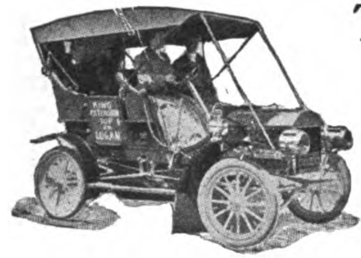
Tops



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Strong
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Made in any style, color or size, for any machine. Prices reasonable. Send for illustrated catalogue and samples.

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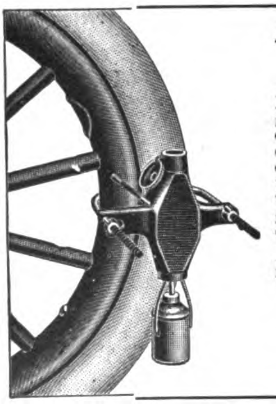

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Blowouts, sandboils, glass cuts or other damaged spots on outer casings; torn off stems, split or punctures to inner tubes vulcanized as good as new with our Vulcanizers.

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HAVE YOUR TIRES REPAIRED

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GENUINE

"Sta-Rite" Plug Regular porcelain plugs have mica, copper and asbestos packings, solid bolts. "Pat. Applied For" on shell and hand turned porcelain tubes. There are no left over "Sta-Rites" at cut prices. Send for 24 p. 1906 cat.

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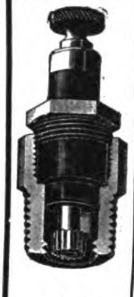

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ALBRIGHT Spark Plug ALL-RIGHT

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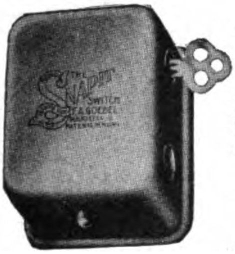

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For Automobiles Motor Boats and Launches

Thief, Dust and Waterproof

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Our Dry Battery is Unequaled

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For SPARK PLUGS

Any size or shape made after drawing or model, of a heat resisting, insulating clay composition especially compounded for this purpose. These tubes have been used for years almost exclusively by all the leading European manufacturers, and have no equal in quality. Inquiries requested.

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"Speedistimeter"

tells speed, distance and time of day at a glance

Easily attached to dashboard of car and extremely neat in appearance—connects with wheel by a flexible shaft passing through floor of car. **Write for Booklet E**

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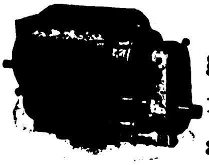

The highest grade and most reliable ignition apparatus for use with your motor.

Remy Electric Company,

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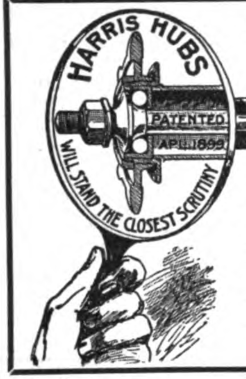
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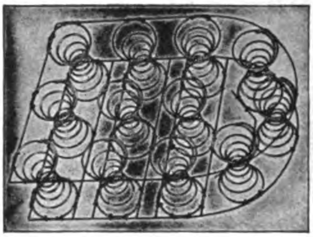

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Let us figure with you.

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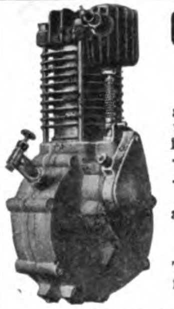

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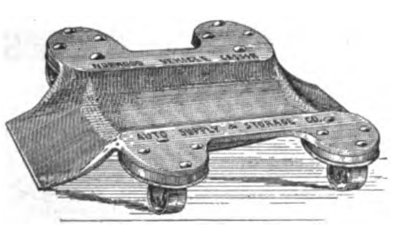

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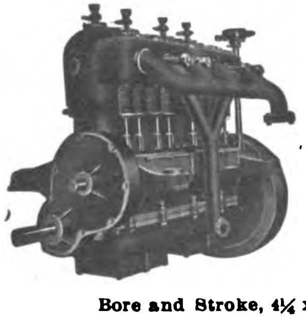

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Bore and Stroke, 4¼ x 4¾

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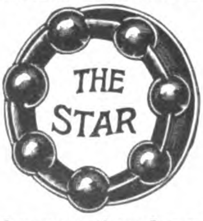

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We manufacture
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Built by Skilled Workmen from the best materials obtainable.

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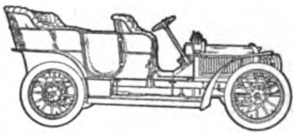

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20-21-26 Feet, $325, $600, $800
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3 to 55 Horsepower
Send for Catalog desired
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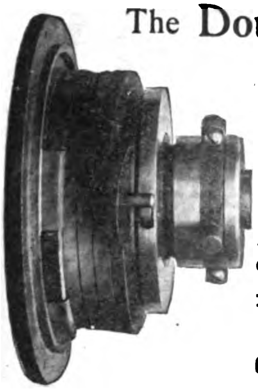

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In four pieces, is the lightest, smallest, simplest, most powerful and cheapest clutch used.

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Transmission Guns

Fit your Cadillac Auto with one of our improved transmission oil **GUNS**, guaranteed to put oil in transmission and not all over the ground. **Price, $1.25**

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Cotter Pins, assorted sizes in screw top wood boxes for your tool kit.
Price, 35c. per box

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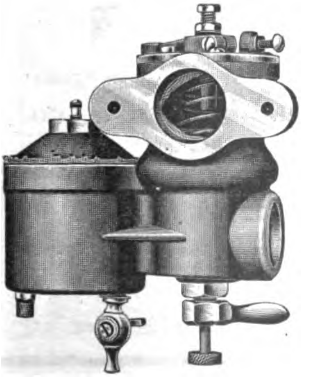

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Absolutely Automatic. Less consumption of fuel. Even mixture at all speeds. Perfect throttle. Increase of power.

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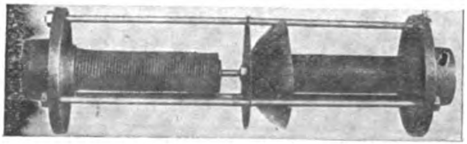

The exhaust after passing out of the spiral wound tube expands in the first chamber, then passes out through a baffle plate to the next expanding chamber, and finally through a perforated tube into the air at a very low heat.

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Our sales at the New York and Chicago Shows proved that Never-Miss merited the name.

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Simplicity, Perfection, Superiority and Durability

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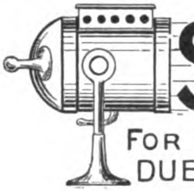

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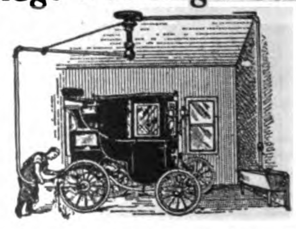

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A BALL Bearing and Cone Combined.
For the smallest to the heaviest work.
No Fitting—just push it on.
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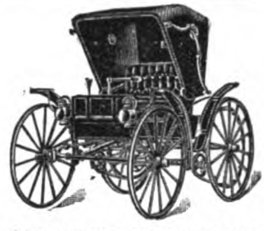

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THREE YEARS OF SUCCESS. No water to freeze, no puncture troubles, no friction clutches, no differential gears, no pump gears. LARGE WHEELS and direct drive give twice the advantage over ordinary machines on muddy, rutty and rocky roads. New hill-climbing power RIDES LIKE A CARRIAGE. Send for Catalog "C."

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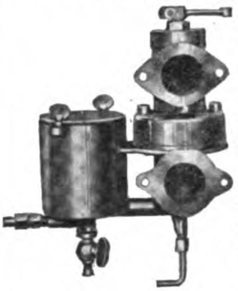

depends to a great extent upon the carburetor.

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...IN...
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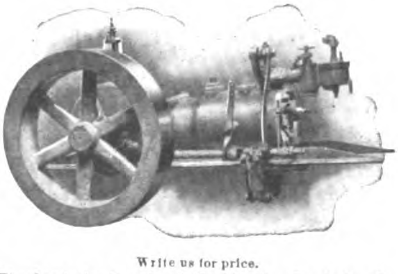
Single Cylinder Bore and Stroke, 4¾x5½.



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FOR SALE—EAGLE TIRE REPAIR CO.—RE-COVERing and repairing foreign domestic shoes and tubes. Dealers in new and re-covered shoes. Repairs guaranteed. 1695 Broadway, New York. Factory, 286 Washington St., corner Chambers.

"EVERLASTIC" IS A COMPOSITION RESEMBLING soft rubber; takes the place of air in the tire; is forced into tire under any air pressure (30 to 150 lbs) till tire is completely filled; just as resilient as air, lasts till tire is worn through outer rubber and the several inner thicknesses of canvas; puncture troubles impossible; carrying extra tires unnecessary; mental strain relieved; tire provocations passed when tire is once filled with "everlastic;" costs about the price of one new tire to fill all four; clinchers filled on the wheels; single tubes on or off; better inquire for there's "something in it." Everlastic Tire Works, Chester, New Jersey.

FOR SALE — WHEELS, TIRES, TRANSMISSIONS, running gears, etc., used for experimental purposes only. Northern Mfg. Co., Detroit, Mich.

IF YOU ARE BUILDING A STEAM CAR AND WISH parts for steam cars, I have same and will sell at reasonable prices; my list includes unions, elbows, checks, Globe valves, pin valves, etc., also springs, bodies, running gears and a few complete steam cars, runabout and touring car style; send for particulars, stating what you wish. K. A. Grout, Orange, Mass.

GREATEST BARGAINS IN USED AUTOMOBILES ever offered in this country; 100 different styles; tell us about what you want and we will send you descriptive matter. C. A. Coey & Co., 1323 Michigan Avenue, Chicago, Ill.

8-10 PASSENGER WAGONETTE, SAMPLE CAR 1905-6 model; steam; price and description on application. Thompson Auto Co., Olneyville Sq., Providence, R. I.

FOR SALE — 1904 PEERLESS, PAINTED GREEN; tires almost new, $1,300; 1903 Auto Car, thoroughly overhauled, $350; 1905 Reo, new, never used, $950; 1905 Reo, slightly used, $700; 1905 Electrical Vehicle Co., Victoria, never used except for a demonstration, $1,050; 1905 Electric Vehicle Co., Brougham, never used, new batteries to be shipped from factory when brougham sold, $2,850; 1905 Columbia, 40 H. P., slightly used for a few demonstrations, $2,750; 1904 2-cylinder Pope-Toledo with canopy top, $350; 1905 Rapid Motor delivery wagon, slightly used, $750; 1905 Buick, canopy top, acetylene lamps, now $775; 1903 2-cylinder Winton, in good shape, canopy top, just the thing for a delivery business, $475. Western Automobile Co., St. Louis, Mo.

FOR SALE—IMPORTED KELECOM MOTORCYCLE, $75.00. Wm. Duncan, Western Ave. Gate, Albany, N. Y.

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FOR SALE—VULCANIZER AND MOLDS FOR AUTOmobile tires. See page 3,9, Auto-Tire Vulcanizing Co., Lowell, Mass.

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FOR SALE—ONE T. H. 15 H. P. 500-VOLT MOTOR, 1600 R. P. M. with rear start; in good condition. Also one 7½ H. P. Bullock motor, 500-volt, 16 R. P. M. "Motor," care of this Journal.

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A1 DOW BOX COIL, COST $12; SELL FOR $5; 2½ H. P. bicycle motor ready to run, $25; 2. H. P. new boat motor, $40; $1.50 spark plug, new, 75 cts. R. H. Putnam, 3 Walnut St., Springfield, Mass.

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FOR SALE—ONE 4 H. P. MOTORCYCLE; AIR-cooled motors; one 10 H. P. cylinder, $75; one 5 H. P. 2-cylinder, opposed, $65; also running gear. Address Box 36, Glendale, R. I.

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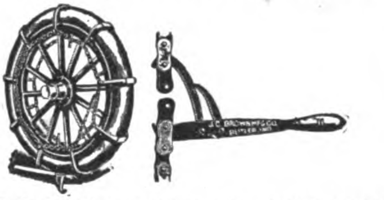
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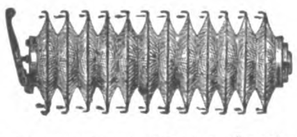

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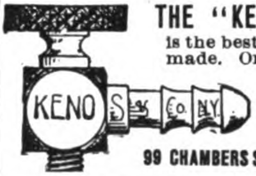

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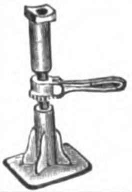

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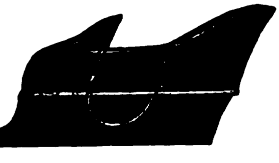

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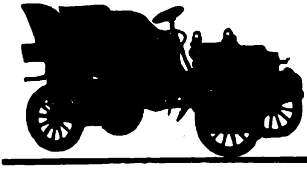

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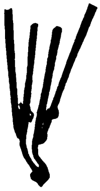

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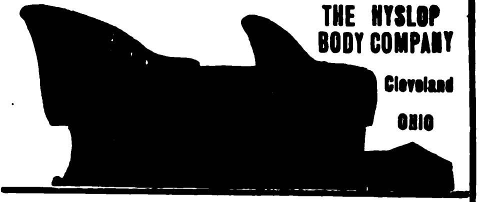

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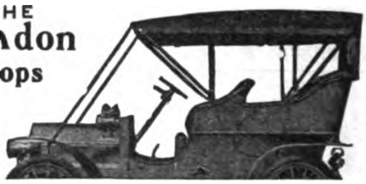

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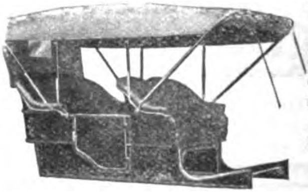

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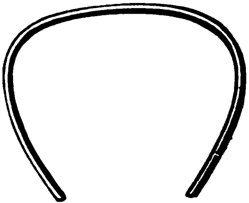

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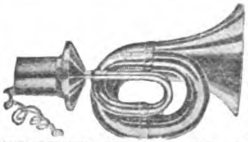

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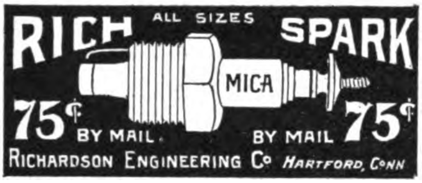

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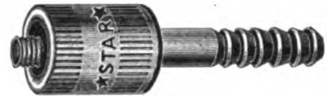

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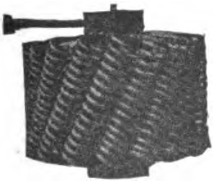

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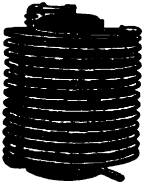

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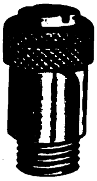

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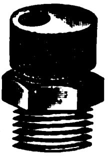

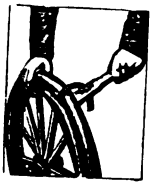

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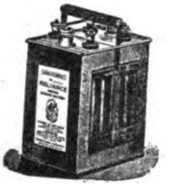

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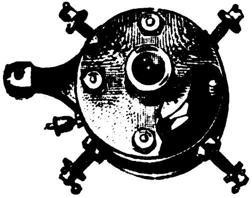

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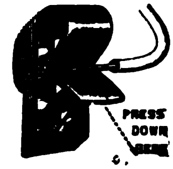

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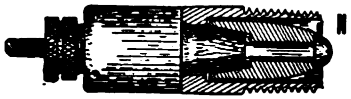

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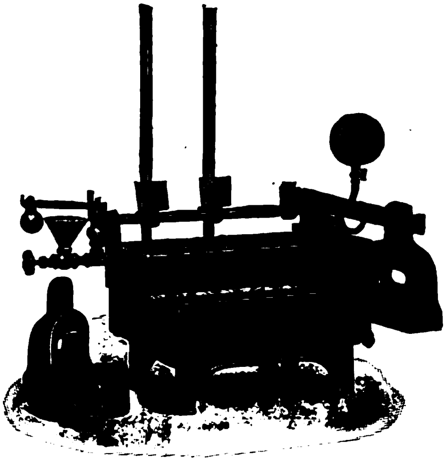

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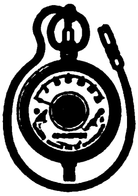

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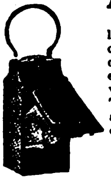

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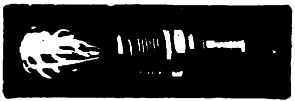

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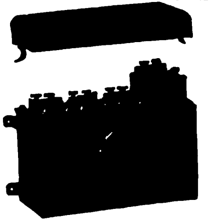

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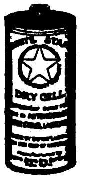

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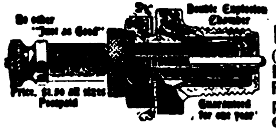

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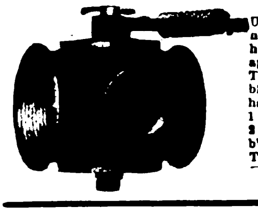

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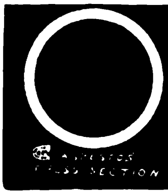

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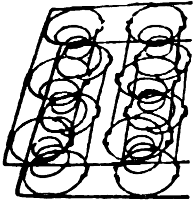

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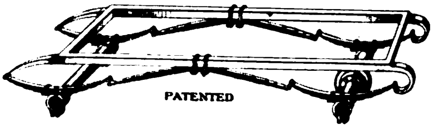

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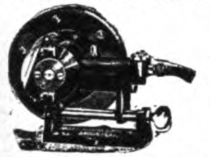

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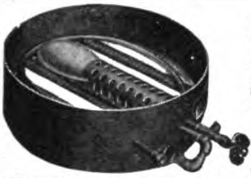

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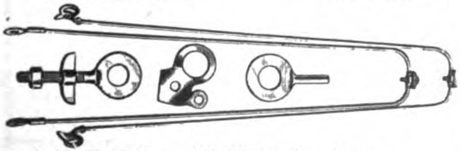

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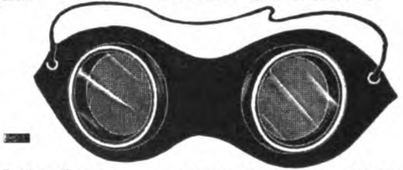

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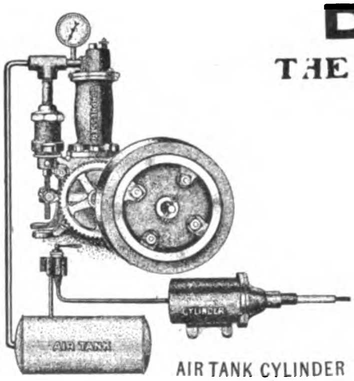

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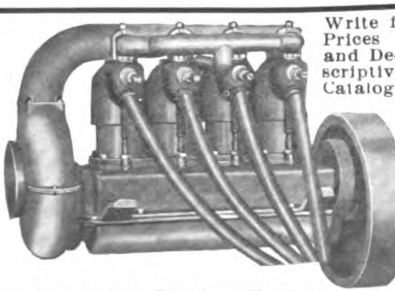

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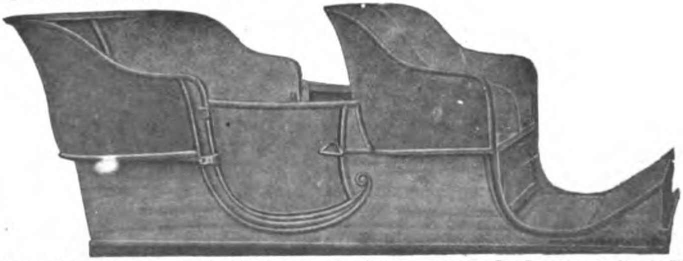

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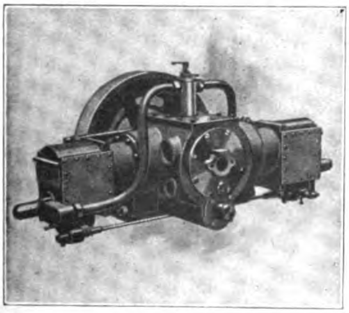
16 H.P. AUTO ENGINE



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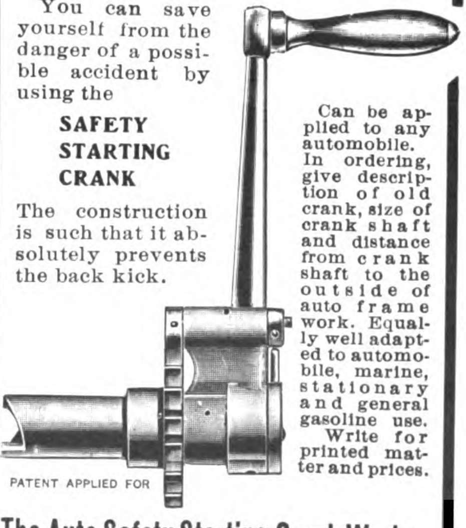

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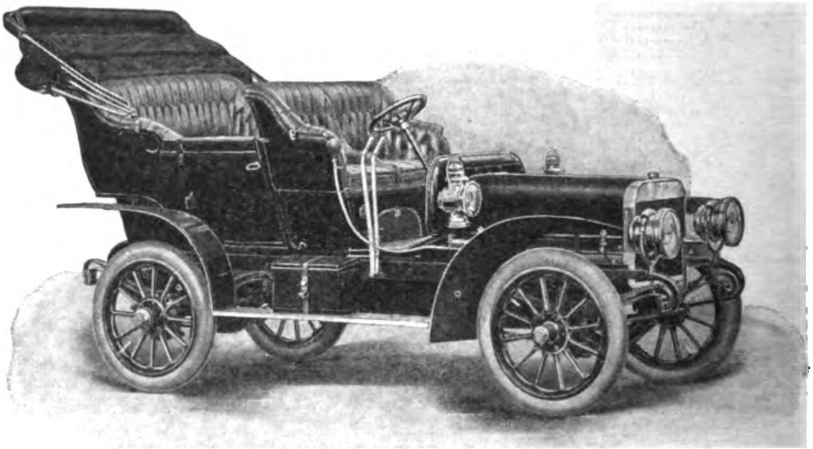

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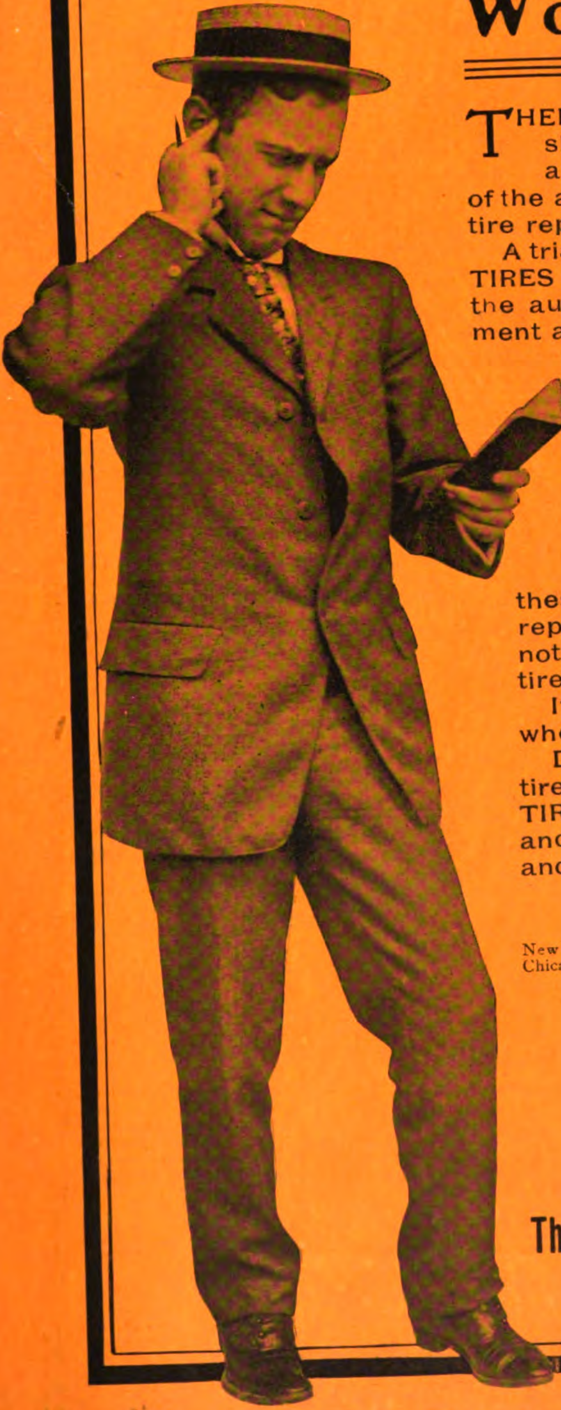

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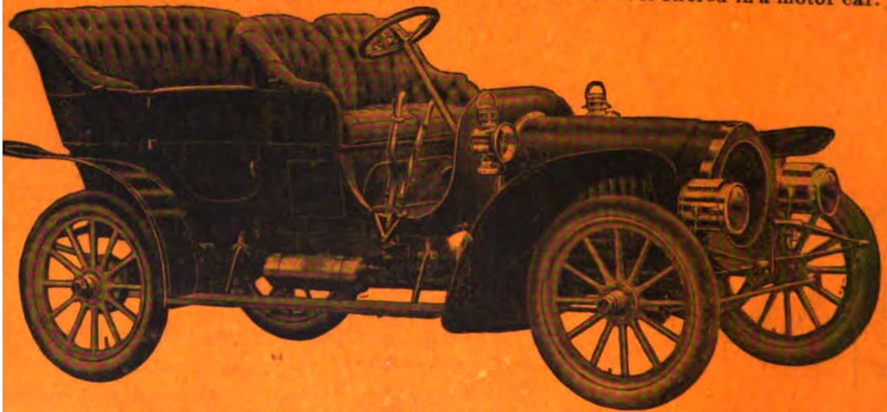

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